Vol. 4 TECHNOLOGY DEPT. OCTOBER, 1922 First Copy Tech No. 7

THE PAPER INDUSTRY

The Monthly Educational Journal of the Paper Industry.

English China Clays
ECCO
CLAYS
TRADE MARK
Sales Corporation
33 WEST 42ND ST., NEW YORK

HIGHEST GRADES
FILLER and COATING CLAYS

Sheahan's Paper Carrier

(PATENTED)

Takes the Paper Automatically Through Dryers

Prevents Accidents *Saves Broke Paper* *No Missed Ends*
No Spearing Due to Missed Ends *No Shut Downs Due to Spearing*

ALL THESE INCREASE PRODUCTION

No Slack Paper On Dryers

Passes the paper at exact speed of dryers

Applicable to all kinds and makes of paper machines.

Following is a partial list of users. Please note the number of re-orders.

International Paper Co.	11	re-orders	
Paul A. Sorg	1		
Sherman Paper Co	1		
District of Columbia Paper Co	1		
Tidewater Paper Mills	2	re-orders	
Abitibi Power and Paper Co., Canada	7	re-orders	
Bryant Paper Co	1		
King Paper Co	1		
Laurentide Paper Co., Canada	7	re-orders	
Finch Pruyn Co	1		
Wheelwright Paper Co	1		
Wausau Sulphate Fibre Co	3	re-orders	
Price Brothers, Ltd., Canada	2	re-orders	
News Pulp & Paper Co., Canada	1		
Fuji Paper Co., Japan	1		
Sakai Celluloid Co., Japan	1		
Brompton Pulp & Paper Co., Canada	1		
New York & Pennsylvania Co	1		
Crown Willamette Paper Co	1		
Fitzdale Paper Co	2	re-orders	
Spanish River Pulp & Paper Co., Canada	1		
Belgo-Canadian Pulp & Paper Co., Canada	2	re-orders	
St. Croix Paper Co., Canada	1		
Fitchburg Paper Co	1		
Ontario Paper Co., Canada	1		

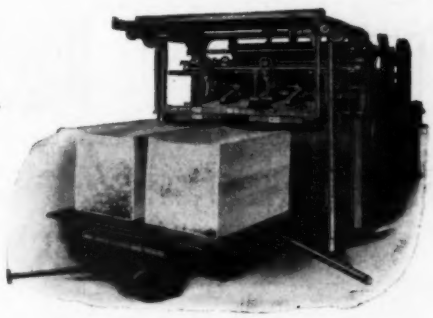
Send for Our Bulletin, "Dryer Group No. 11"

The Bagley and Sewall Company

WATERTOWN, NEW YORK

U. S. A.

Don't flinch, don't foul,
Hit the line hard.
—THEODORE ROOSEVELT



"Hit the line---hard!"

A formidable fact "formation"

There are seven live facts in the Lay Boy "line."

These seven facts are hard-hitting fellows—assertive against the opposing line of many undiminished costs.

The two Ends are
"Increased Output."
"Paper Piled straighter."

The two Tackles are
"Fit any make of Cutter."
"Operate Automatically."

The two Guards are
"Utilization of present trucks."
"Makes wide cutters desirable."

The Center is the husky lad, "LABOR SAVING"

IS not one effective way to combat today's problems to "hit" them just as two splendid football teams meet in vigorous battle?

As one man puts it, grab a nettle lightly and it stings you, but grasp it firmly and you feel no injury.

M & W Lay Boys are good players in the game of business—they "line up" perfectly and help you to "hit the line hard"—and effectively.

On receiving a letter from you, we will be glad to do either one of two things—(1) submit prices—(2) send the Lay Boy on thirty days' trial.

Signals!

The Moore & White Company
ESTABLISHED 1886
No. Phila. Sta., P. R. R., PHILADELPHIA, PA.

Vol. 4—No. 7

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

CONTENTS

FOR OCTOBER, 1922

Editorials ..... 885, 889 and 893
Serving the Customer ..... *H. M. Grasselt* 909
The Safe Finishing Room ..... *Charles E. Walker* 911
Power Plant Management ..... *Robert June, M. E.* 913
Putting a New Wire on the Fourdrinier ..... *Harry Williamson* 915
Pointers for the Engineer ..... *W. F. Schaphorst, M. E.* 917
Methods of Modern Management ..... *G. W. Hafner* 919
The Power System ..... *John F. Ferguson* 921
Difference Between Appraisal and Inventory ..... *W. W.* 923
Lubrication of Paper Mills ..... *T. C. Porteus* 924
Fall Meeting of Technical Association 928-A
The Port Alice Plant of the Whalen Pulp and Paper Mills, Ltd 929
The Goggle Problem in a Paper Mill ..... *Raymond A. Steffen* 937
Commercial Outlook 981
Domestic Markets 983
Current Quotations 989
Import and Export Markets 991
Buyers' Guide 997-1001
Index to Advertisers 1003

TERMS: To U. S., Alaska, Hawaii, Philippines, Porto Rico, Cuba and Mexico the subscription price is $2.00 per year. Canada, $2.50. Other countries, $3.00.

Entered as second-class matter February 13, 1920, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

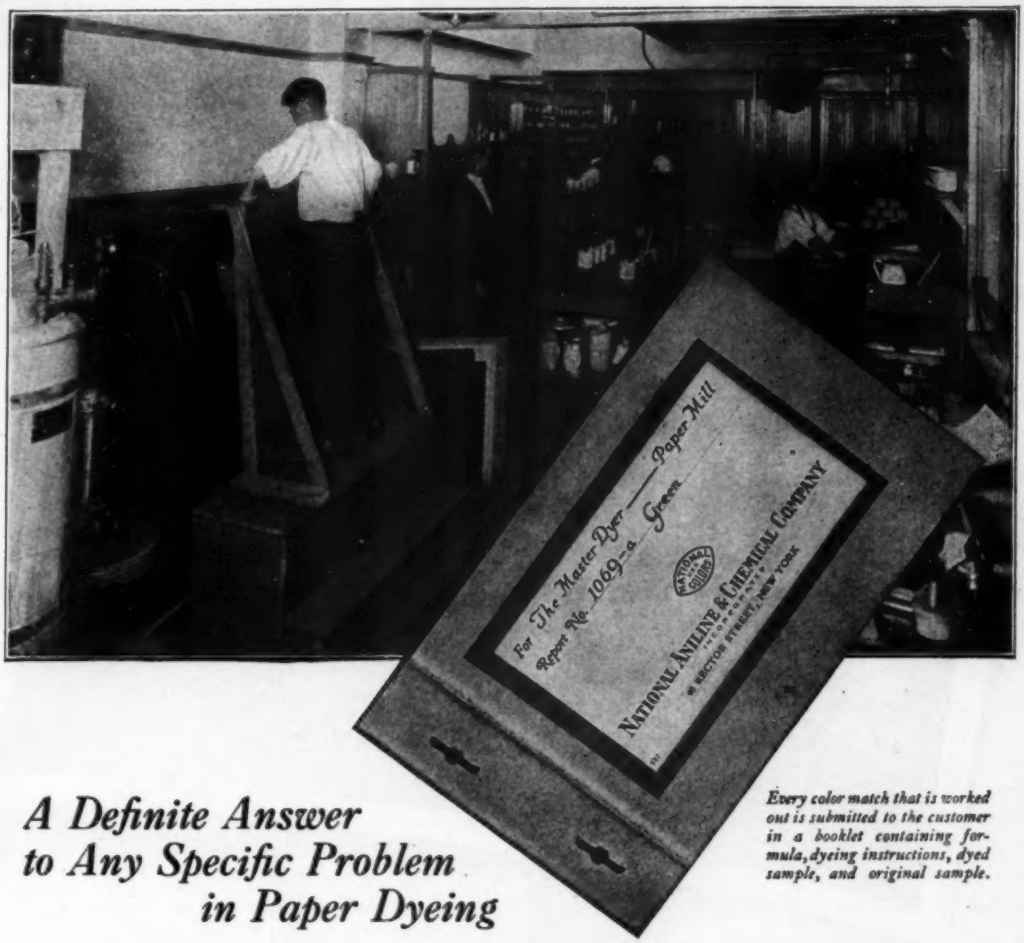
Copyright 1922 by

EDWARD B. FRITZ, Publisher

356 Monadnock Block Tel. Wabash 7327 Chicago, Ill., U. S. A.

Eastern Office: 53 Park Place, New York City

NATIONAL U.S.A. DYES


For The Master Dyer —— Paper Mill
Report No. 1069-a Green
NATIONAL ANILINE & CHEMICAL COMPANY
INCORPORATED
21 BECTON STREET, NEW YORK

Every color match that is worked out is submitted to the customer in a booklet containing formula, dyeing instructions, dyed sample, and original sample.

A Definite Answer to Any Specific Problem in Paper Dyeing

Every dyer knows the value of a practical working laboratory. But not every dyer has the facilities at his command to work out formulas and methods of color application that are required in the development of new shades and particular effects in paper manufacture.

The "National" Paper Laboratory is operated as an important part of the service to which users of "National" Dyes are entitled.

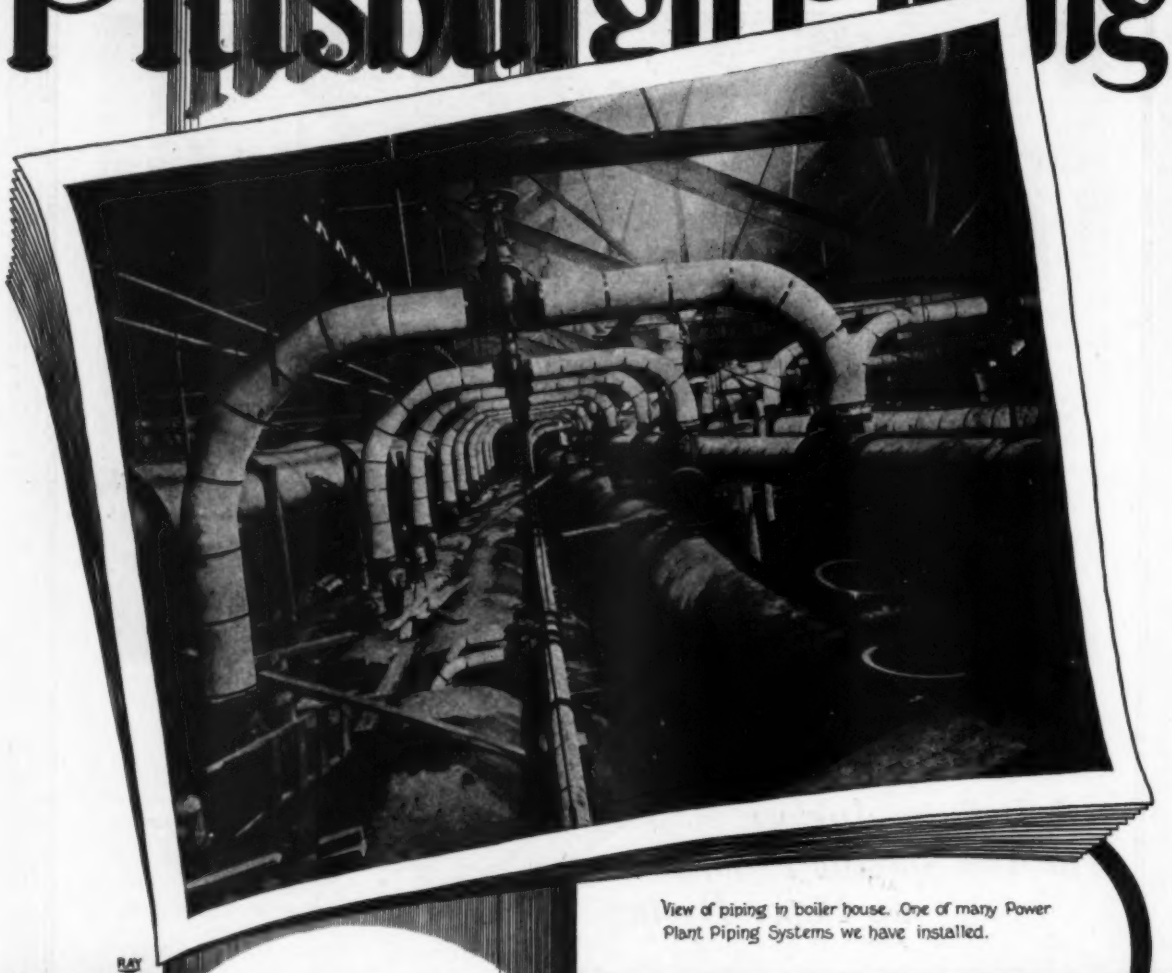
Here you will find specialists in paper dyeing who are constantly engaged in finding the right answer to every problem submitted to them—an answer expressed in proved formulas, supported by dyed samples and definite working instructions.

You are invited to use this laboratory freely.

National Aniline and Chemical Company, Inc.

New York Chicago Charlotte Toronto Philadelphia
Boston Hartford Montreal Providence San Francisco

Pittsburgh Piping



View of piping in boiler house. One of many Power Plant Piping Systems we have installed.

KNOWLEDGE, Experience and Complete Organization—welded together for the manufacture and fabrication of Power Plant Piping that stands for Uniformity, Quality and Distinctive Service.

"WHEN YOU THINK OF PIPING THINK OF PITTSBURGH PIPING."

Pittsburgh Piping & Equipment Co

MANUFACTURERS & CONTRACTORS

Specialists in Welded Wrought Steel Headers, Flanged Iron and Steel Fittings, Pipe Bends and Fabricated Piping for Power Plants.

Pittsburgh, Pa.

NEW YORK, 220 BROADWAY. CHICAGO, PEOPLES GAS BUILDING.
CLEVELAND, AMERICAN TRUST BUILDING. SAN FRANCISCO, MONADNOCK BUILDING.
INDIANAPOLIS, TRACTION TERMINAL BUILDING. BIRMINGHAM, AMERICAN TRUST BUILDING.

Power, and Plenty of It

The "Caterpillar's" field of usefulness is by no means limited to logging. There is a "Caterpillar"* of size and capacity for every power need. On farm or ranch, in the mining and oil industries, for building and maintaining roads, removing snow and doing other civic work—wherever tractive power and endurance are at a premium, the "Caterpillar"* has no real competitor.*

CATERPILLAR
Reg. U.S. Pat. Off.

In the frozen woods of the North, the "Caterpillar"* Logger provides dependable and economical power for every condition. It has a wide range of speeds, enabling it to haul over all grades, as well as to operate at faster speeds on the level and on return trips. It is easily controlled and steered, can be instantly turned within its own length, so operates in close quarters and on sharp turns. Where required it operates off the road in making up trains.

From extensive experience and constant study of the needs of the lumberman, the Northern "Caterpillar"* Logger has been developed to its present high state of efficiency. It is equipped with every accessory and operating convenience for work in the woods. Experienced lumbermen and pulp wood manufacturers everywhere recognize the "Caterpillar"* as the one machine indispensable for swamping out and building roads, toting supplies to camps, and for transportation work of every kind.

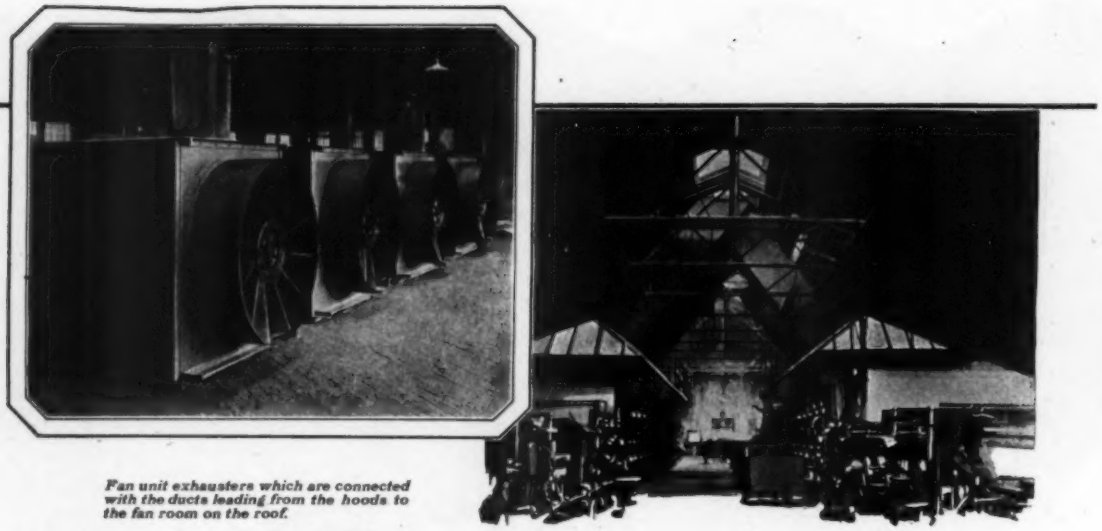
Our motion pictures, exhibited free upon request, show the Northern "Caterpillar"* Logger on actual jobs. We are prepared to furnish convincing evidence of "Caterpillar"* savings as compared with any other method or machine. Ask for catalog.

**There is but one "Caterpillar"—Holt builds it*

HOLT
PEORIA, ILL.
STOCKTON, CALIF.

The Holt Manufacturing Co., Inc.
PEORIA, ILLINOIS

Complete service stocks carried at: Duluth, L'Anse, Mich.; Butternut, Wis.; Rhinelander, Wis.; Minneapolis, New York, Bangor, Spokane; Montreal, Que.



Fan unit exhausters which are connected with the ducts leading from the hoods to the fan room on the roof.

Removes Water Vapor and Furnishes Fresh, Heated Air

In the production of 50 tons of paper in 24 hours over 700,000 grains of water are evaporated per minute.

Unless this water vapor is prevented from precipitating on roofs and other parts of the mill, rapid deterioration occurs. A sufficient volume of hot dry air must be provided to absorb this moisture.

The amount of moisture carried per cubic foot of air must not be in excess of the saturation capacity when cooled to the temperature of the interior roof surface.

Any shortage either in quantity or temperature of the air supplied for moisture absorption results in condensation on the roof and the dropping of dirty water on the paper machine.

Our engineers have specialized in the ventilation of paper mills and through years of experience are well qualified to co-operate with you.

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

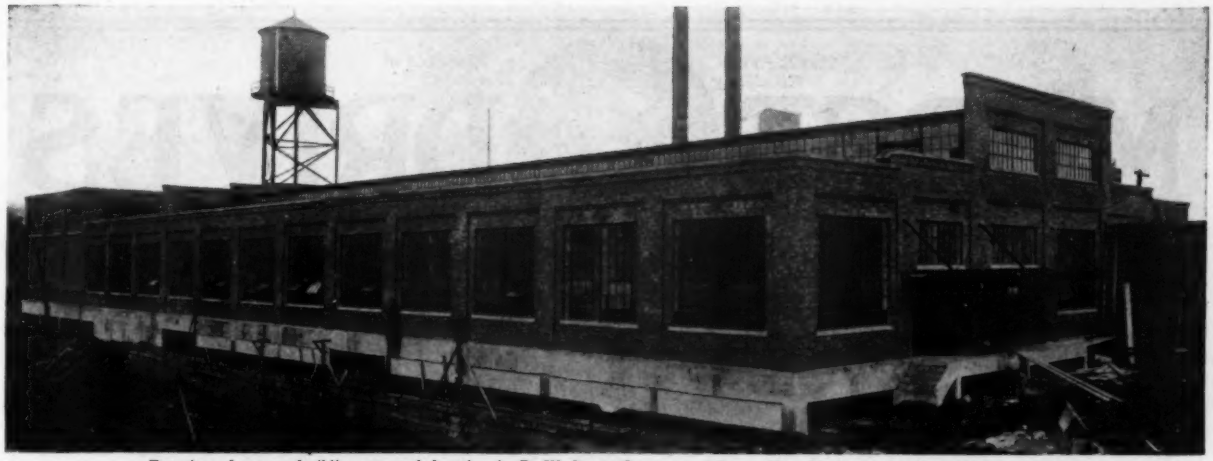
(147)

"Sirocco" Products

TRADE MARK

BLOWERS · EXHAUSTERS · VENTILATING FANS · AIR WASHERS · ENGINES

FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT



Exterior of a new building erected for the A. P. W. Paper Company, Albany, New York—an Austin repeat contract.

An Austin-built plant extension for the Peninsular Paper Company, Ypsilanti, Michigan.

Exterior of A. P. W. Paper Company's plant at Albany, New York, designed, built and equipped by The Austin Company.

Interior of A. P. W. Paper Company's plant at Albany, New York.

Complete plant of the Chillicothe Paper Company, Chillicothe, Ohio, designed, built and equipped by The Austin Company.

Have Your New Building Ready Before Winter

There is still time for you to move into a new building and have it ready for use before the snow flies. Austin ability to construct even the larger types of buildings with the greatest speed makes this possible.

Delays due to present-day business conditions can be largely overcome by the speedy erection of new buildings and installation of equipment. You can have a completely equipped Austin Standard Building or a specially designed structure in 30, 60 or 75 working days, depending upon size and the general building conditions.

Your building will be as substantial as steel, brick and concrete can make it.

The Austin Company was just awarded a contract to rebuild the Oswekatchie Paper Company's plant at Gouverneur, New York, recently destroyed by fire.

If you are considering the profit advantages of branch plant and warehouse operation you will find an Austin Branch Organization in every section of the country fully prepared to give you the same prompt and complete building service—which includes engineering, building, and equipment. All or any part of this Austin service is available to you. Phone, wire or use the coupon.

THE AUSTIN COMPANY, Cleveland, Ohio

Engineers and Builders

THE AUSTIN METHOD

Chicago, Cleveland, Detroit, Pittsburgh, Philadelphia, New York, Dallas, St. Louis, Seattle, Birmingham, Los Angeles
The Austin Company of California

AUSTIN

ENGINEERING BUILDING EQUIPMENT

Pl-Oct.

THE AUSTIN COMPANY, Cleveland, Ohio

Gentlemen: We would be interested in having a copy of "The Austin Book of Buildings." It is understood that this request involves no obligation. We are interested in branch plants and warehouses, and would appreciate receiving additional literature and information.

Firm .....

Individual .....

Address .....

The Sign of Efficiency

MORSE DRIVES

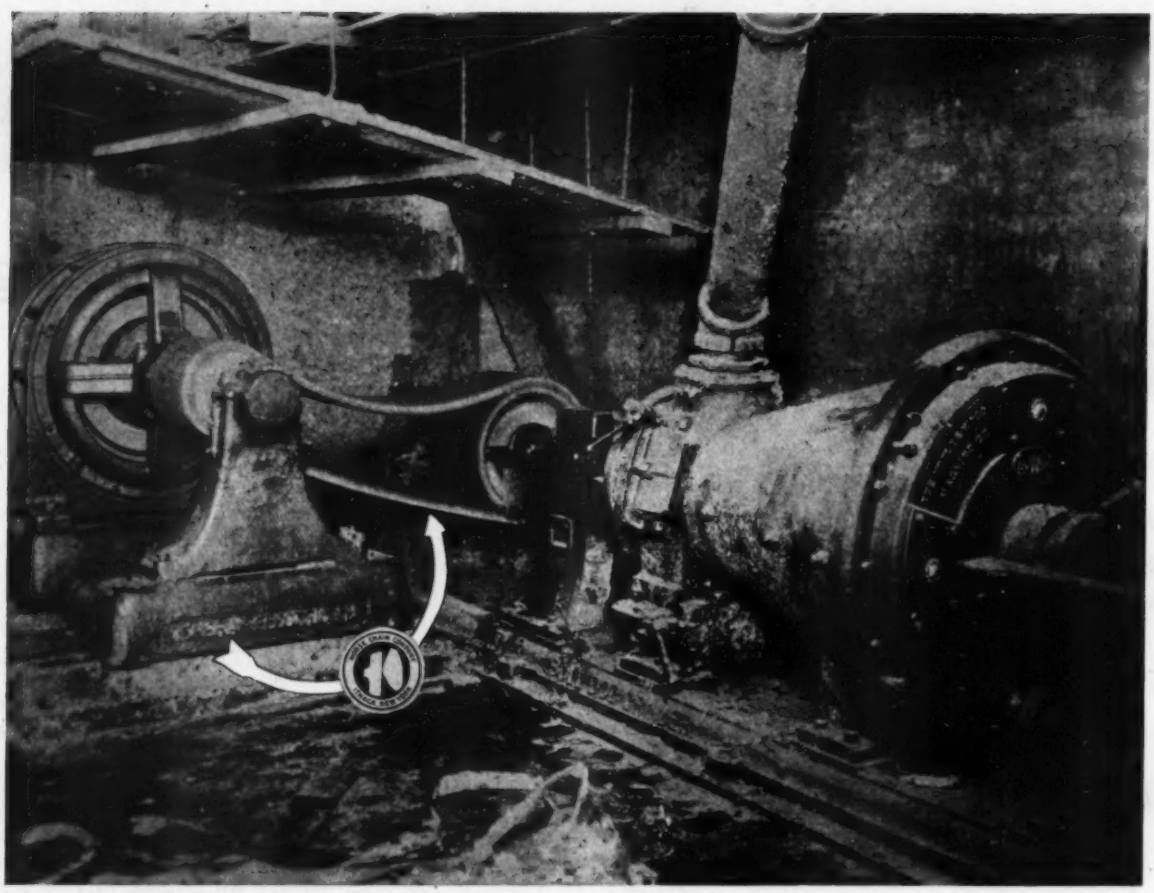
The Sign of Durability

THE MORSE "ROCKER JOINT"

Positive as Gears

Flexible as a Belt

Longer Life



Fifteen Morse Silent Chain Drives in Congoleum Company Mill

The illustration shows one of the fifteen Morse Silent Chain Drives in the mill of the Congoleum Company, Asbestos, Maryland, driving a Jordan engine from a 150 H.P. motor on felt stock, one of the hardest kinds of stock to refine.

This mill uses the following Morse Chain Drives:—one 150 H.P.; four 100 H.P.; nine 90 H.P.; one 75 H.P.; all doing splendid work.

Morse Chains are 99% efficient, silent, durable and economical to maintain.

Where you have unusual and hard conditions from wear and exposure, Morse Silent Chains prove their greatest worth.

For driving Jordan engines, beating engines, paper machine line shafts, and for many other places in the paper mill, the ideal drive is the Morse Silent Chain.

MORSE CHAIN CO., LARGEST MANUFACTURERS OF SILENT CHAINS IN THE WORLD ITHACA, N. Y.

Write today for booklet

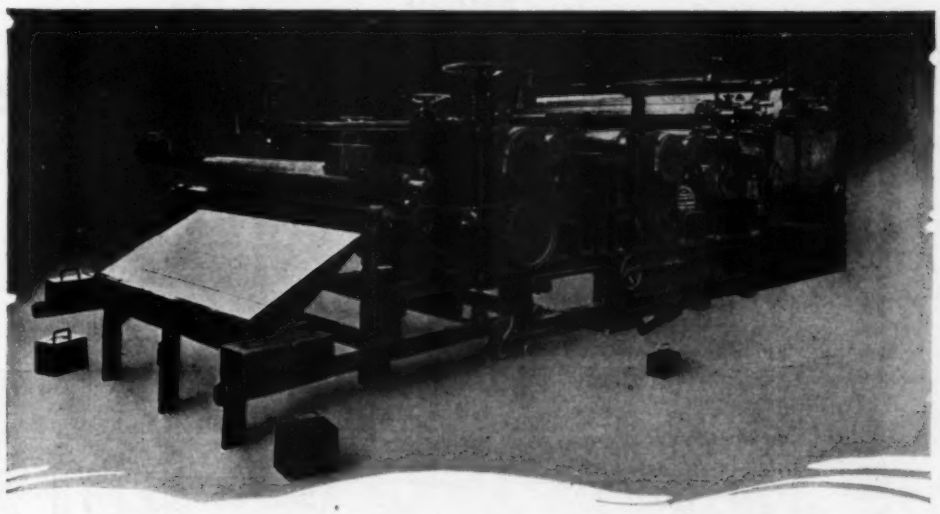
Morse Engineering Service **BENEFIT BY MORSE SERVICE AS OTHERS DO** *Assistance Without Obligation*

Address Nearest Office

ATLANTA, GA.....Chandler Bldg., Earl F. Scott & Co.
BALTIMORE, MD.....1402 Lexington Bldg.
BOSTON, MASS.....141 Milk Street
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....Merchants L. & T. Bldg.
CLEVELAND, OHIO.....Engineers Bldg.
DETROIT, MICH.....1361 Abbott Street
KANSAS CITY, MO.....Finance Bldg., Morse Eng'rg Co.
NEW YORK CITY.....30 Church Street
MINNEAPOLIS, MINN.....So. 3rd St., Strong-Scott Mfg. Co.
MONTREAL.....St. Nicholas Bldg., Jones & Glassco Reg'd
PHILADELPHIA, PA.....Fuller Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
SAN FRANCISCO, CAL.....Monadnock Bldg.
ST. LOUIS, MO.....Chemical Bldg., Morse Eng'rg Co.
TORONTO.....Bank of Hamilton Bldg., Jones & Glassco Reg'd
WINNIPEG, MAN.....Dufferin St., Strong-Scott Mfg. Co.

"Morse" is the Guarantee Always Behind the Efficiency, Durability and Service

SKF



Water from Shower Pipe Turns

Ball Bearing Equipped Cylinder Mould

SO little power is required to drive a cylinder mould equipped with **SKF** marked self-aligning ball bearings, that the *mere force of the water from the shower pipes* is sufficient to turn it when the couch roll is lifted.

This free easy running of self-aligning ball bearings explains why felts last about twice as long, when cylinder moulds and couch rolls are thus equipped, as they do where plain bearings are used. In addition to prolonging the life of felts, cylinder moulds last longer and a substantial saving is effected in power consumption and lubrication costs.

Realize these economies and at the same time eliminate shutdowns for adjustments and replacements which result in idle men and machinery, by changing over to ball-bearing equipment.

THE SKAYEF BALL BEARING COMPANY

Supervised by **SKF** INDUSTRIES, INC., 165 Broadway, New York City

834

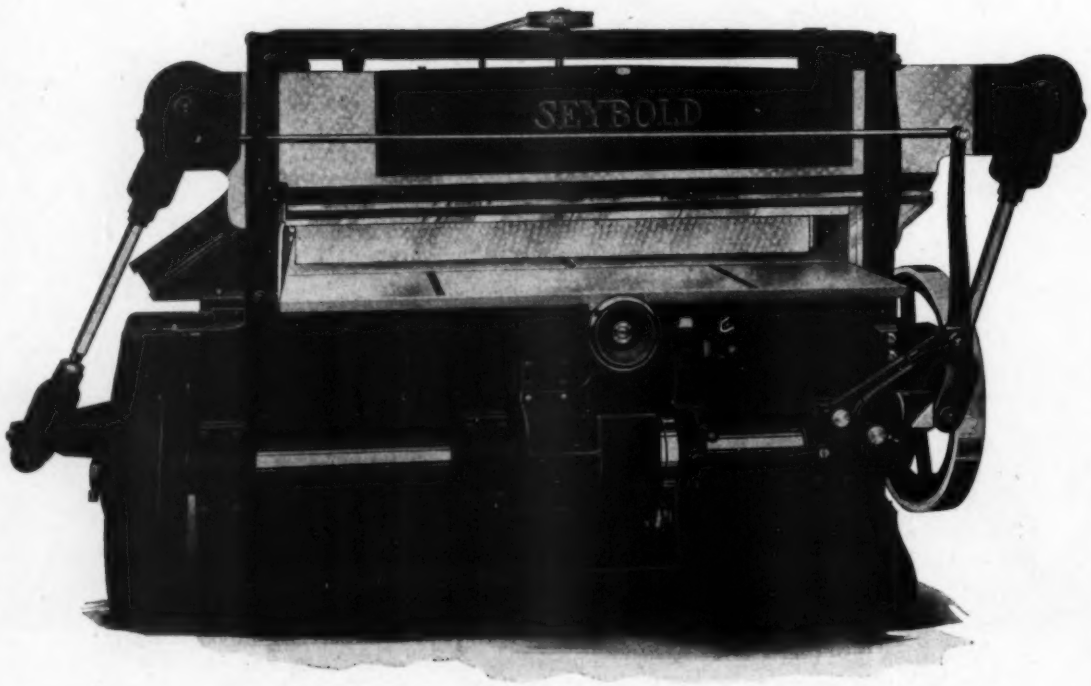
Normal View *Deflected View*

BALL BEARINGS
The Highest Expression of the Bearing Principle

Uninterrupted Production

from

The Seybold Automatic Cutter



Built Especially for Paper Mill Use
With Seybold Flexible Clamp for Cutting Piles of Uneven Thickness

THE SEYBOLD MACHINE COMPANY

MAIN OFFICE AND FACTORY
DAYTON, OHIO, U. S. A.

Sales Agencies and Service Stations:

New York Chicago Atlanta Dallas San Francisco Toronto Paris London Buenos Aires Stockholm

Paper Industry Profitable

WHILE the opening of the fall business on the first of October was ushered in with rather unusually warm weather, the end of the week saw a change for the better, and reports from all sections indicate a general broadening of merchandising activities.

The last three months of this year's business have begun, and under conditions so favorable that they promise a splendid windup for a hard year. The long and disastrous coal strike is settled; the miners are back at work and the output of coal is only limited by the ability of the railroads to furnish cars to transport it. The disastrous railroad strike is finished and only one comment needs to be made, and that is that it never should have taken place. It was a senseless and costly strike. The railroad men sought to punish the railroads, and yet during the strike the railroads moved the largest tonnage of freight in their history. However, that strike has passed into history, but its futile and disastrous lessons should not be lost to the commercial and industrial world. The financial stability of the country is beyond apprehension; a demand for all kinds of fabricated goods is here. There is no shortage of labor anywhere, but a certainty that all available labor can and will be employed at high earning power from now on insures a great purchasing power on the part of the buyers of all commodities.

The paper business in general will profit from these advantageous conditions. The consumption of newsprint is great and increasing; the demand insistent, and the supply well taken care of. The tendency is toward further advance in prices. Fine writings, catalogue and book papers, and wrapping paper mills are all working on a plentiful supply of orders. Mills from all districts report full order books and business in prospect to run them into the winter.

The business outlook for 1923 is of material interest. While business for the next three months seems assured, yet business men are looking forward with anxious eyes to conditions in 1923. We call attention to the situation in steel, which has always been more or less a sound barometer of trade conditions. Reports coming to us now state that the steel mills have orders for 1,500,000 tons of steel rails for 1923 delivery, for 150,000 tons of steel bars and plates, for 5,500 freight cars, and with continued buying and placing of orders for the first quarter of 1923. All of this is to the good, and when compared with the same date of a year ago shows a promising, healthy outlook for commercial and industrial activity of large proportions, not only for the concluding months of 1922 but for the first three months of 1923. In other words, buyers of all kinds of materials today are placing futures, a practice that has not been known since the beginning of 1920. The advice which THE PAPER INDUSTRY has been giving monthly to its readers—to purchase its supplies of all kinds of paper during the past months—seems amply justified by conditions that now obtain and which promise to continue for the coming six months. We want no boom, we want no secondary inflation of any considerable proportions. We will have somewhat of an inflation, that goes without saying, it is a necessary consequence of the artificial conditions produced by the coal and railroad strikes, and the disinclination of the buyers to carry normal stocks. Replenishment of stocks of paper in particular is the order of the day, and the building up of reserve stocks of paper by both jobbers and consumers will go on for months to come.

Where Good Rolls come from

Since 1882 Goodrich has been building rubber rolls for the paper industry with the same enterprise and thought for the customer that characterizes every Goodrich-made article.

Its experience with rubber paper mill rolls is as old as the rubber paper mill roll itself.

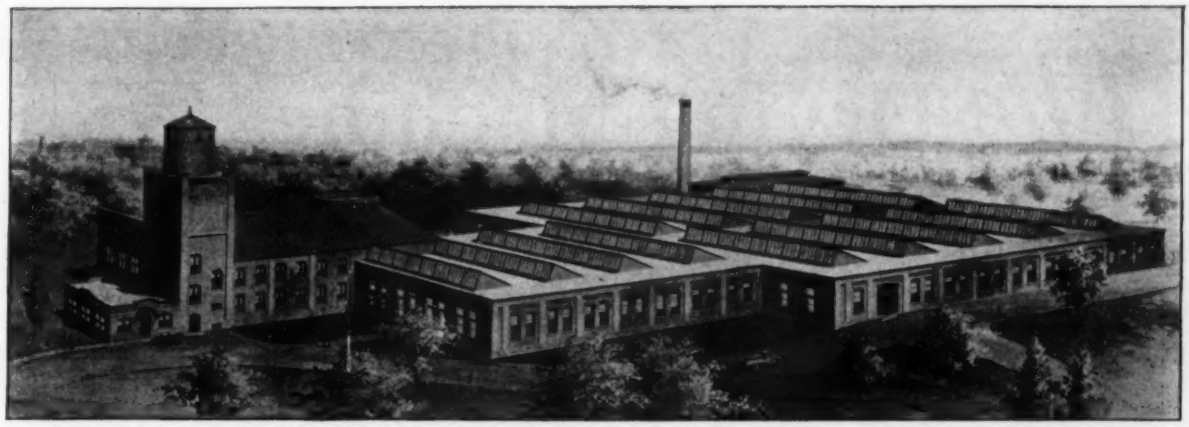
With this knowledge of Goodrich experience before you, you can feel confident that Goodrich can and will deliver to you a roll that will prove satisfactory, dependable and economical no matter how exacting or peculiar the service may be.

Rolls for fast running fourdriniers, box board and cylinder machines; couch rolls; waxing and sizing rolls; all general and special service rolls; felt wringers.

THE B. F. GOODRICH RUBBER COMPANY
Akron, Ohio

GOODRICH
Rubber Rolls

Best in the Long Run



KENWOOD MILLS, LTD., Arnprior, Ontario, Canada

THE same skill and knowledge which have won a reputation for the desirability and economy of Kenwood Felts and Tan Jackets, made at Albany, are applied at the Canadian Plant. Modern construction, latest improved machinery, fine power facilities and unlimited pure water, combined with the unrestricted wool markets of the world, and all backed by the full experience of Kenwood Mills of Albany, place this Canadian Mill in a splendid manufacturing position.

F. C. HUYCK & SONS

Kenwood Felts, Seamless Felts and Tan Jackets are scientifically designed for openness. They will make a smooth, firm sheet and give long wear.

KENWOOD MILLS, Albany, N. Y.

The Drying Machine

Which Saves Labor, Fuel and Product

Dries pulp fibre plaster and other boards **uniformly, flat and smooth,** in one trip through the machine.

All machines adjust automatically to different thickness of product.

Furnished in sizes to meet mill and manufacturing conditions.

Well adapted to drying pulp for shipment.

CATALOGUE ON REQUEST

THE H. P. COE DRYING MACHINE CORPORATION

50 Church St. New York, N. Y.

EDITORIALS

The Proof of the Pudding

THOSE portions of the Fordney-McCumber tariff affecting most vitally the pulp and paper interests of the country are now a matter of history, and though many accept them with a humble and a contrite heart, the degree of one's acceptance is regulated in some measure by individual considerations not always related to the industry as a whole. The comparison by the Literary Digest of the tariff, after its thousands of changes, to the little boy's knife which had had six new blades and seven new handles and yet was the same knife after all, brings to mind the vast interests involved and the infinite pressure brought to bear upon the drafters of the bill, the conference committee, and the individual and collective members of the two houses.

The law of compensations which continues to operate irrespective of race or party will undoubtedly bring about a gradual adjustment of the continued burden of taxes. Mr. John J. McGowan of the Newark Sunday Call believes that while we are going to have both tariff and income tax, the more we have of a reasonable tariff the less we shall have of income tax.

However that may be, the difficulties confronting the makers of a tariff in its drafting would seem almost insurmountable when one considers how dovetailed and interwoven the various business interests of this country are with each other and with foreign countries. There seems to be no end to the conflicts of interests. If these unavoidable conflicts, however, are allowed to disturb the real improvement that has followed a return of public confidence, based upon increasing employment and the increasing demand for the products of industry, by ill-advised propaganda for and against an incontrovertible fact, there will be infinitely more harm done to the business and manufacturing interests of the United States than could be accomplished by a hundred Fordney-McCumber tariffs.

It would seem from an unbiased survey of the political situation that there is still little real unrest in the public mind at the present time. This will naturally increase as the next presidential election draws nearer, but the time, it would seem, has come when a nation such as ours ceases to elect its president as it roots for a ball team. What a man has done, more than what he promises to do, is the soundest indication of future performance, and to choose such a man without disrupting a nation's business and undermining the majority of the people's confidence in politics in general is sound business policy.

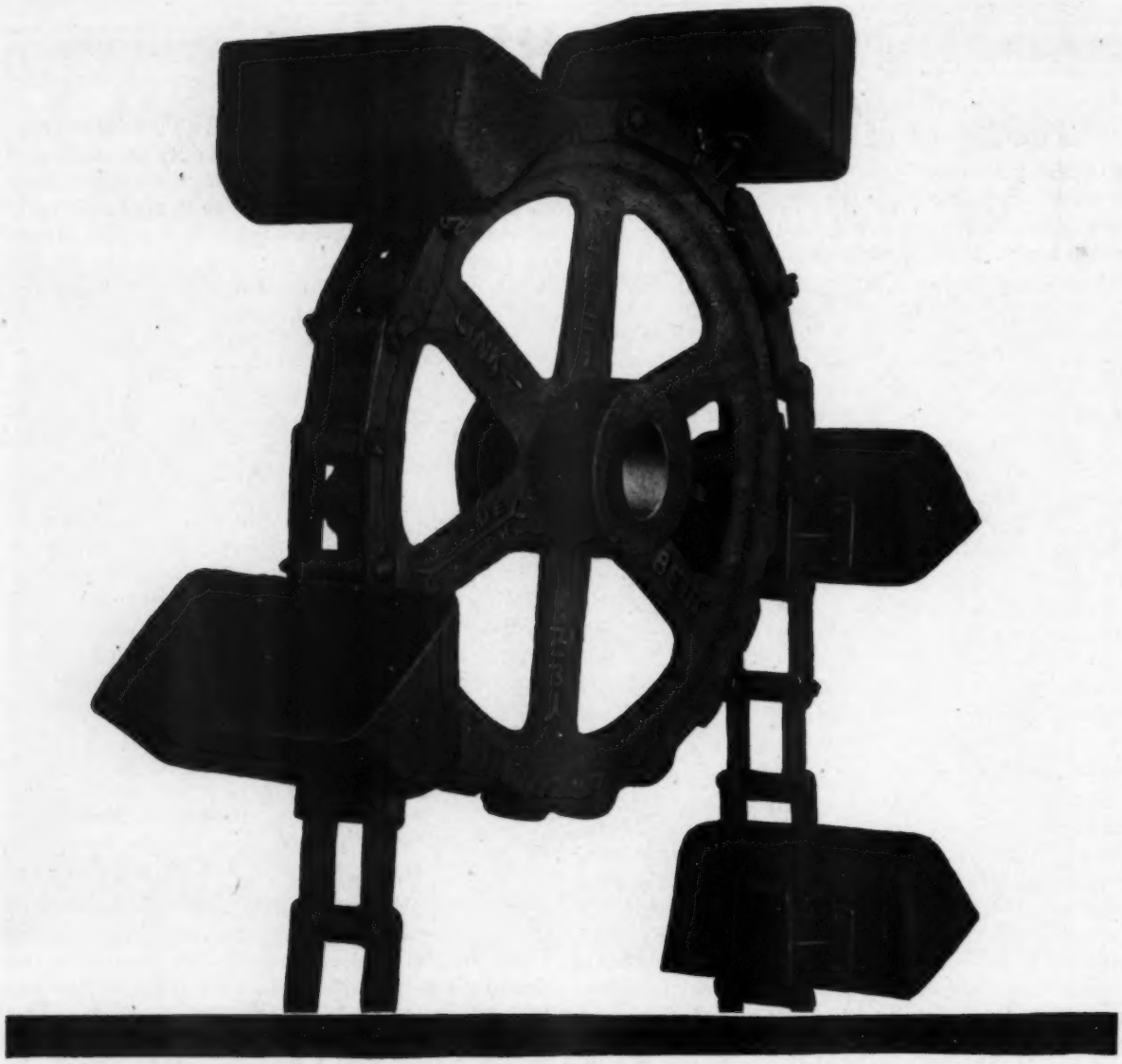
The lack of this Republican Congress to place a reasonable duty on newsprint and all grades of pulp, while at the same time it places a duty on casein and other chemicals and manufacturing needs and otherwise causes adjustments in the trade, may eventually increase co-operation and lead to a better understanding throughout the industry. "Let our docility to our own law demonstrate the poverty of nature and fortune beside our native riches."

Newsprint Consumption Steadily Increasing

IN VIEW of the vigor with which the American Publishers' Association is prosecuting its campaign to reduce the enormous consumption of newsprint in this country, it is interesting to note that the increase in consumption is approximately fifteen percent the first six months this year over a corresponding period in 1921. The present rate of consumption of 2,200,000 tons a year is the highest ever registered in the history of the industry. Advertisers, banking on the business boom predicated for this fall, are contracting for unprecedented newspaper space, with the result that the market is strengthening every week and prices are expected to reach a high water mark within a very short time.

The American Publishers' Association considers the situation in their trade so serious that it has revived the Print Paper Conservation Committee, appointing sub-committees in every state for the purpose of bringing about local co-operation. They claim, it is said, that the present increase of ninety-one per cent over pre-war costs in print papers is due largely to the reckless issuance of unnecessary editions and the general spendthrift attitude of publishers in general, and urge their members to eliminate useless consumption by systematic condensation and economy of space.

The fact, however, that figures prove that the general reading public is increasing constantly must be taken into consideration in computing possible causes of increased consumption. Manufacturers of newsprint are divided as to the resources of this country and their ability to maintain a corresponding increase in the production of this community. Nevertheless, economic conditions have a habit of adjusting themselves to meet new demands. Research, invention, and the exploitation of new fields, inevitably permit expansion in any trade and afford an added stimulus to the wheels of industry. No one need concern himself unduly over one cog in an endless chain which may slip but never breaks.



There is no *Better* Combination than Link-Belt ➢ FLINT-RIM ➣ Wheels and Link-Belt Chains

They fit each other snugly. There is no sliding or slipping as the links seat themselves against the teeth, and they continue to fit each other snugly, because the flint hard surfaces prevent wear.

Measure values in length of service, and you will find there is no *cheaper* combination than ➢ FLINT-RIM ➣ wheels and Link-Belt Chains.

Send for Catalog and full particulars

687

LINK-BELT COMPANY

PHILADELPHIA	CHICAGO	INDIANAPOLIS
New York.....Woolworth Bldg.	Detroit.....4310 Woodward Ave.	Louisville, Ky..Frederick Wehle, Starks Bldg.
Boston 9.....49 Federal St.	Kansas City, Mo.....306 Elmhurst Bldg.	New Orleans, C. O. Hinz, 504 Carondelet Bldg.
Pittsburgh.....1501 Park Bldg.	Seattle.....220 First Ave., S.	Whitney Supply Co., Ltd., 418 S. Peters St.
St. Louis.....Central National Bank Bldg.	Portland, Ore.....101 First Ave.	Birmingham, Ala.,
Buffalo.....547 Ellicott Square	San Francisco.....168 Second St.	S. L. Morrow, 720 Brown-Marx Bldg.
Wilkes-Barre.....2nd National Bank Bldg.	Los Angeles.....163 N. Los Angeles Ave.	Canadian Link-Belt Co., Ltd.,
Huntington, W. Va....Robson-Prichard Bldg.	Denver, Lindrooth, Shubart & Co., Boston Bldg.	Toronto and Montreal
Cleveland.....429 Kirby Bldg.		

H. W. CALDWELL & SON CO., CHICAGO. NEW YORK, Woolworth Bldg. DALLAS, TEXAS, 709 Main St.

MOORE

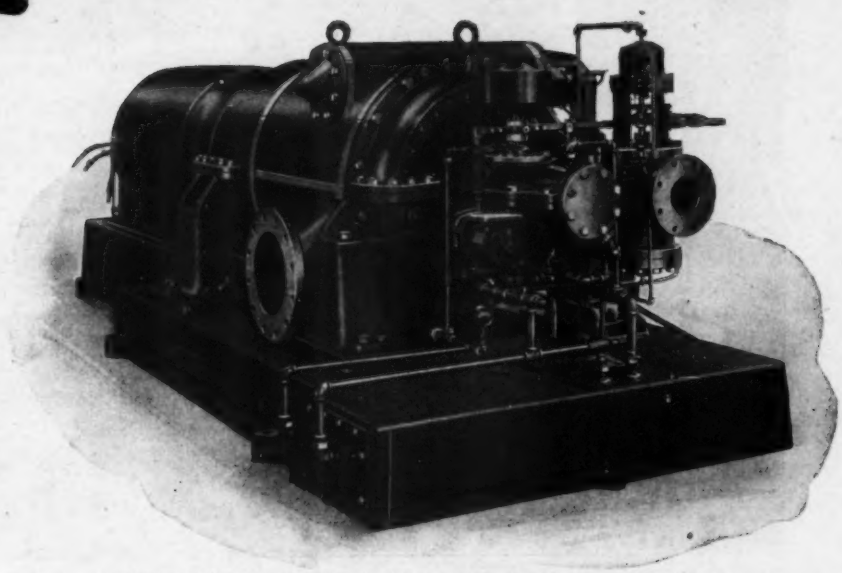
"Best at every turn"

MOORE

Non-Corrosive Buckets
Reamed Nozzles
Large Clearances
Low Speeds
Safe Stresses
Dependable Governors
Horizontally Split Casings and Diaframs
High Steam Economy
Low Steam Velocities
Trustworthy Automatic Control

Simple Design—
Honest Construction

Offices in All Principal Cities

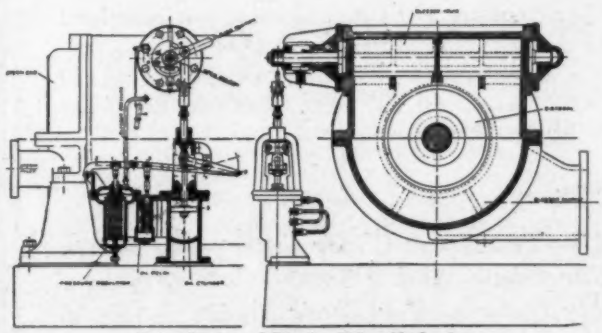


Bleeder Turbo Generator Showing Bleeder Exhaust. Sizes up to 1000 K. W.

BLEEDER TURBINES

Use Steam for Heating or Cooking?

Then you absolutely require a Moore Bleeder Turbine—it makes power a by-product.



Cross Section of Bleeder Valve Mechanism

It will usually pay for itself in less than a year—oftimes better than a 100% investment.

Where you have used the old style reducing valve—with entire loss of the power due to the steam pressure drop—the Moore Bleeder turns that power into electrical or mechanical energy.

Where you have blown to the air the back pressure steam which you didn't need, the Moore saves it and extracts all the energy—turns it into power.

Where a Moore Bleeder is used there will never be any steam lost. It is a wonderful reducing valve, the power from which will operate your plant.

Our engineers will gladly assist you.

Interested? Bulletins upon request.

Moore Cylindrical Bleeder Valve

Self contained—compact.
No lost efficiency—turns easily on two end bearings—rust proof—low temperatures.
Easily removed—only a few parts.

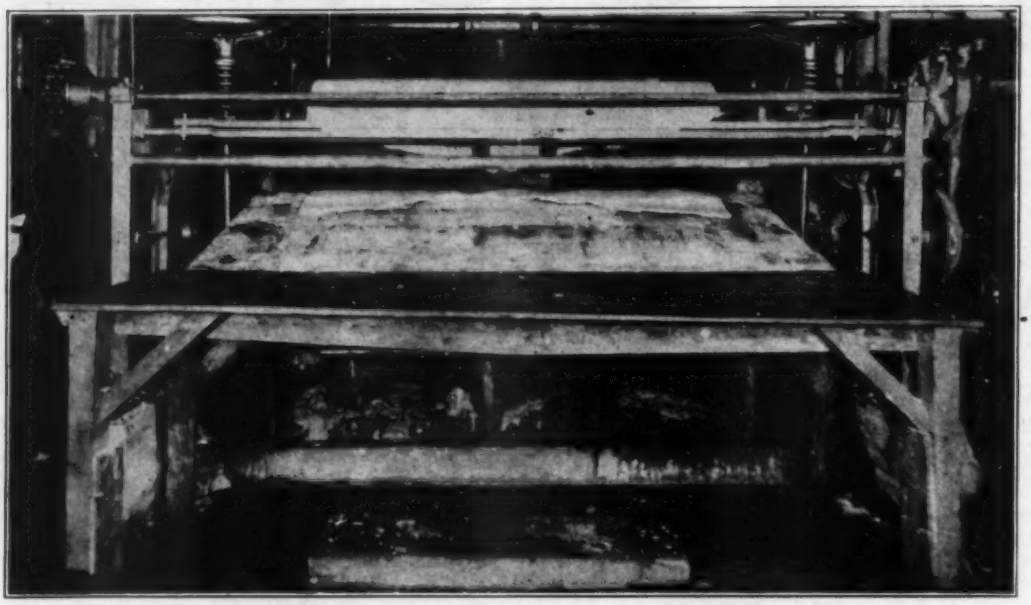
Turbines 5 to 1500 H. P.
Turbo Generators up to 1000 K. W.
Direct connected or geared.

MOORE STEAM TURBINE CORPORATION

WELLSVILLE, NEW YORK

THE NORTH ROLL SKINNER

(Patent Applied For)



This picture shows a lap of hemlock sulphite being skinned off the roll by the North Roll Skinner

THE North Roll Skinner accomplishes what pulp makers have been trying to do for fifty years. It automatically cuts off or skins pulp laps at any **predetermined weight,** and every lap the same weight. Without human help, this skinner cuts any kind of pulp and cuts it every time.

The device consists of two sticks made of hard but not sharp material which rest at the ends of the top roll of any wet machine, and at a set thickness of pulp, move quickly to the center, meet and then move back again. On the way back the sticks lay the flat lap on the table or conveyor.

The North Roll Skinner will fit any wet machine and not mark the roll. It does not bear hard on the roll so as to wear out the felt.

One man can now fold for two wet machines and he doesn't tear any felts. **The felts saved pay for the Skinner.**

We also manufacture The North Save-All—The North Water Filter—The North Thickener and Washers—The Scott Shredder—Stuff Pumps—Gate Valves—Knives, Roll Bars and Bed Plates—Safety Guards (For Super Stacks)—Special Machinery and Castings (Grey iron and semi-steel).

Green Bay Foundry & Machine Works

GREEN BAY, WISCONSIN

Self-Reliance

Society

AS OUR Religion, our Education, our Art look abroad, so does our spirit of society. All men plume themselves on the improvement of society, and no man improves. Society never advances. It recedes as fast on one side as it gains on the other. Its progress is only apparent, like the workers of a treadmill. It undergoes continual changes; it is barbarous, it is civilized, it is Christianized, it is rich, it is scientific; but this change is not amelioration. For every thing that is given, something is taken. Society acquires new arts and loses old instincts. What a contrast between the well-clad, reading, writing, thinking American, with a watch, a pencil and a bill of exchange in his pocket, and the naked New Zealander whose property is a club, a spear, a mat, and an undivided twentieth of a shed to sleep under. But compare the health of the two men, and you shall see that his aboriginal strength the white man has lost. If the traveler tells us truly, strike the savage with a broadax, and in a day or two the flesh shall unite and heal as if you struck the blow into soft pitch, and the same blow shall send the white to his grave. The civilized man has built a couch but has lost the use of his feet. He is supported on crutches, but loses so much support of muscle....

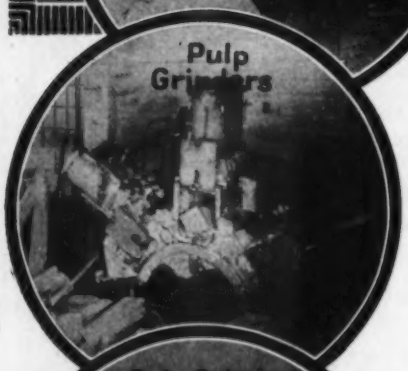
His note books impair his memory; his libraries overload his wit; the insurance office increases the number of accidents; and it may be a question whether machinery does not encumber; whether we have not lost by refinement some energy, by Christianity intrenched in establishments and forms, some vigor or wild virtue. For every stoic was a stoic; but in Christendom where is the Christian?

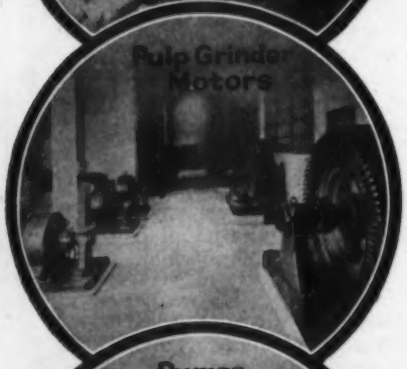
The harm of the improved machinery may compensate its good. Hudson and Behring accomplished so much in their fishing boats as to astonish Parry and Franklin whose equipment exhausted the resources of science and art. Columbus found the New World in an undecked boat. It is curious to see the periodical disuse and perishing of means and machinery which were introduced with loud laudation a few years or centuries before. The great genius returns to essential man....

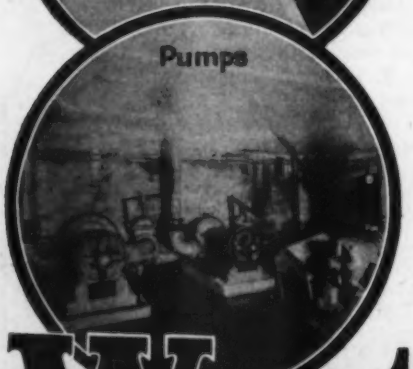
Insist on yourself; never imitate. Your own gift you can present every moment with the cumulative force of a whole life's cultivation; but of the adopted talent of another you have only an extemporaneous, half possession. That which each can do best, none but his Maker can teach him.

If our young men miscarry in their first enterprise, they lose all heart. If the young merchant fails, men say he is ruined. If the finest genius studies at one of our colleges, and is not installed in an office within one year afterward in the cities or suburbs of Boston or New York, it seems to his friends and himself that he is right in being disheartened and in complaining the rest of his life. A sturdy lad from New Hampshire or Vermont, who in turns tries all the professions, who teams it, farms it, peddles, keeps a school, preaches, edits a newspaper, goes to Congress, buys a township, and so forth, in successive years, and always, like a cat, falls on his feet is worth a hundred of these city dolls. He walks abreast with his days, and feels no shame in "Not studying a profession," for he does not postpone his life, but lives already. He has not one chance, but a hundred chances. Let a stoic arise who shall reveal the resources of man, and tell men they are not leaning willows, but can and must detach themselves; that with the exercise of self-trust, new powers shall appear....RALPH WALDO EMERSON.

W
WESTINGHOUSE ELECTRIC







What Can Be Accomplished by Complete Electrification

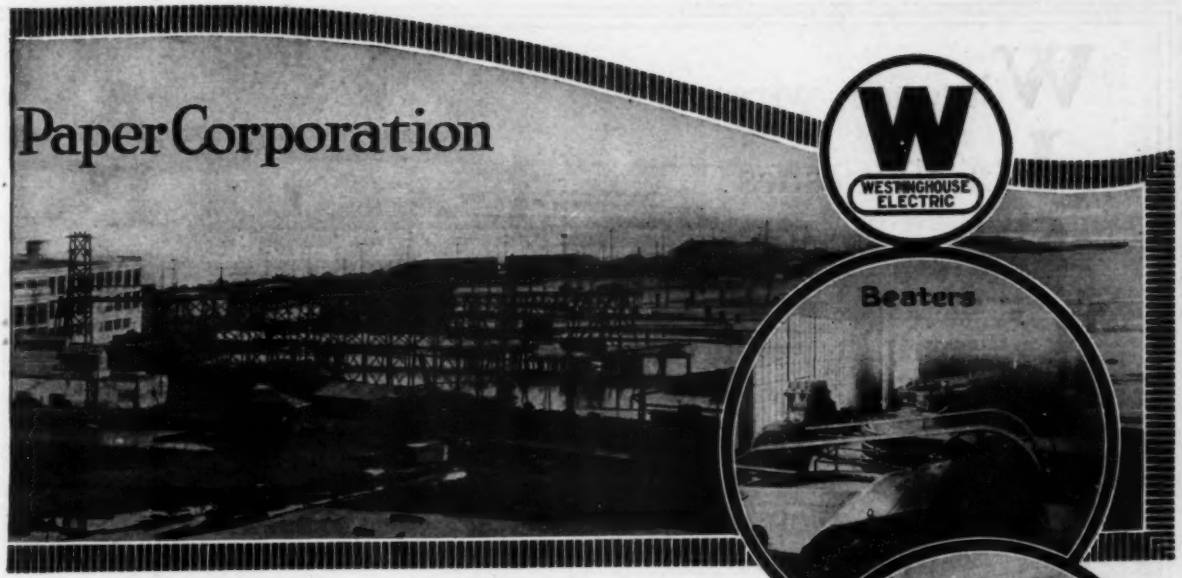
The plant of the Washington Pulp & Paper Corp., Port Angeles, Wash., is one of the best-arranged in the country. It exemplifies what can be accomplished when electrification forms part of the original project.

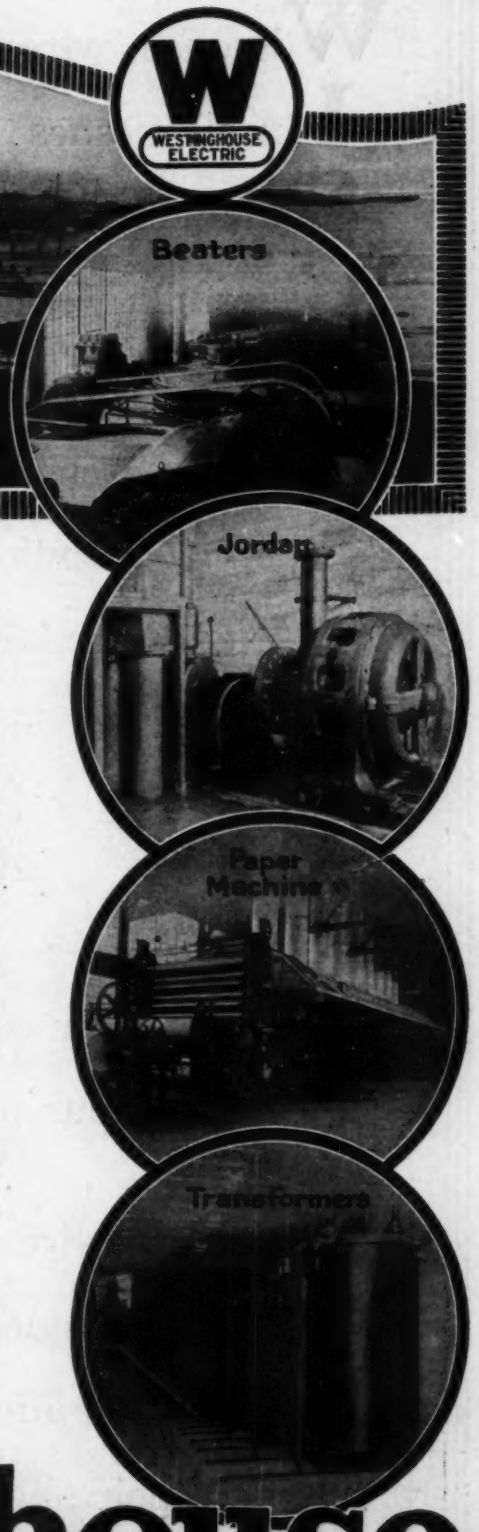
In the selection and arrangement of machinery, the builders were guided entirely by the requirements and the best functioning of paper-making processes. The principal buildings, such as pulp mill, power house, beater and machine buildings, are re-inforced concrete construction. Electrification imposes no restrictions either in plant construction or the arrangement of machinery.

The Benefits Are Far-Reaching

Electrification should be looked upon as more than an economical means of utilizing power. Use electricity throughout your entire mill and you effect many operating refinements and advantages entirely foreign to the better and more efficient use of power itself.

Westinghouse





For example: In the electrified plant, the operator is able to co-operate more satisfactorily with the executive because he can present authentic operating data when it is asked for. By means of switchboard instruments, electric power can be measured accurately —both at the source of generation and points of application. The operator is provided an accurate means of tracing abnormal operation to the offending cause. This opens the way to maximum efficiency in all departments of the mill.

A full appreciation of the many benefits of complete electric operation, has led to the complete electrification of the Port Angeles plant of the Washington Pulp & Paper Corp.

The performance of our initial installation was so satisfactory that when increased capacity was decided upon, Westinghouse apparatus was again selected.

Westinghouse Electric & Mfg. Co.

East Pittsburgh, Pa.

Sales Offices in All Principal American Cities

Westinghouse

WISCONSIN

Wisconsin wires
In all meshes
Suitable for paper making purposes
Carefully woven by experts only
On most modern looms, built
Not for greatest production, but with
Special attention and care given
In construction of these machines to
Need of "Quality first."

WIRE

Wisconsin wires
Increase your tonnage
Reduce your costs, and
Enlarge your profits.

WORKS

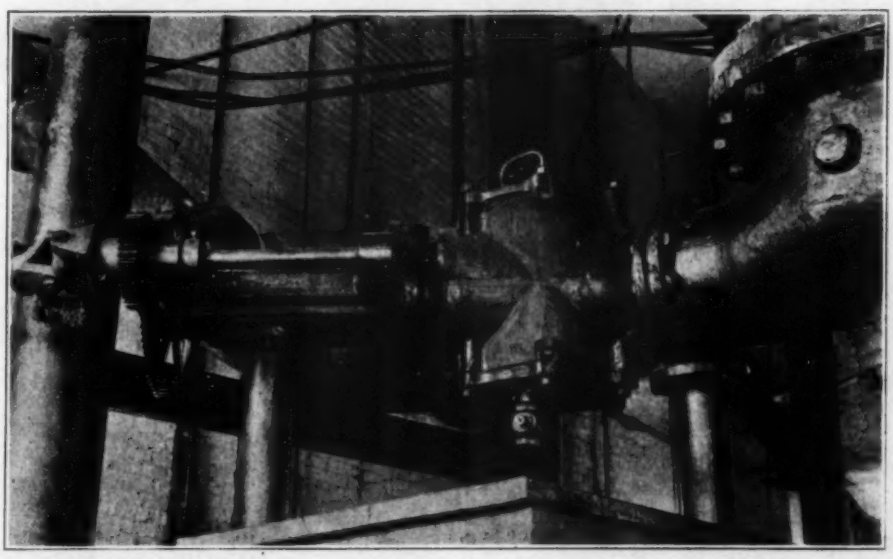
Wisconsin wires
Of highest quality,
Remarkable life,
Keep their alignment, and have
Seams that neither mark nor break.

APPLETON WISCONSIN

The Horkman

Improved Safety Blow-Off Valve

(PATENTED)



The above is an actual installation of a Horkman Valve in the Wisconsin Rapids Plant of the Consolidated Water Power and Paper Company.

Write for Specifications to

HENRY HORKMAN, Neenah, Wisconsin

For Driving Condenser Auxiliaries

IN any auxiliary drive dependability of operation is of paramount importance. Terry turbines receive their energy directly from the boiler, avoiding the cycle of main unit, generator, switchboard, fuses and wiring required by motors. They are therefore free from all external disturbances except boiler failure.

Extreme simplicity of construction reduces internal disturbances to a minimum, a fact proved in over 8,000 installations in successful operation.

For your removal pump, injector pump, circulating pump or hot well pump unit, you will be assured dependable service if you

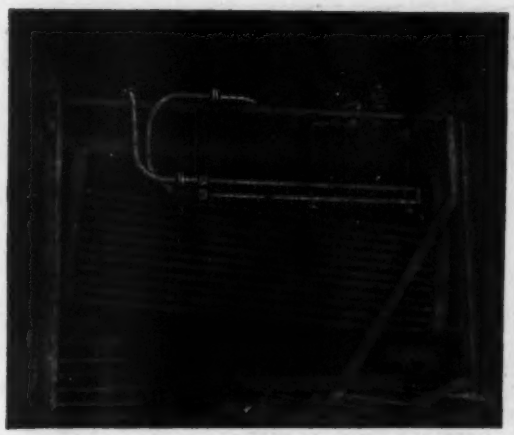
specify

THE TERRY TURBINE

T-735

Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.



There's a

Foster Superheater

for every type of boiler

Whether your boilers are fire-tube, or water-tube with drums lengthwise or crosswise, and tubes horizontal or vertical, straight or curved, we can install Foster Superheaters in them. And you can depend on the installation being placed where it will obtain maximum superheating effect with greatest efficiency and without interfering with proper draft conditions. Where boilers are now being overloaded, and have little or no reserve capacity for future increase, an investigation of the possibilities of superheat may show that it will not be necessary to purchase additional boilers. Many plants have found that where a 10 or 15 per cent increase in boiler output was required or anticipated, the difficulty was satisfactorily solved by installing Foster Superheaters.

And increase in boiler capacity is only a single one of the many advantages obtained through the use of superheat. Investigate the benefits of superheat and the advantages of Foster Superheater construction. We will gladly give you information that may help you make new records for economy.

Power Specialty Company

General Offices: 111 Broadway, New York

Boston, Philadelphia, Pittsburgh, Chicago, San Francisco, Dallas, Kansas City, London, England
Works: Dansville, N. Y., Egham, England

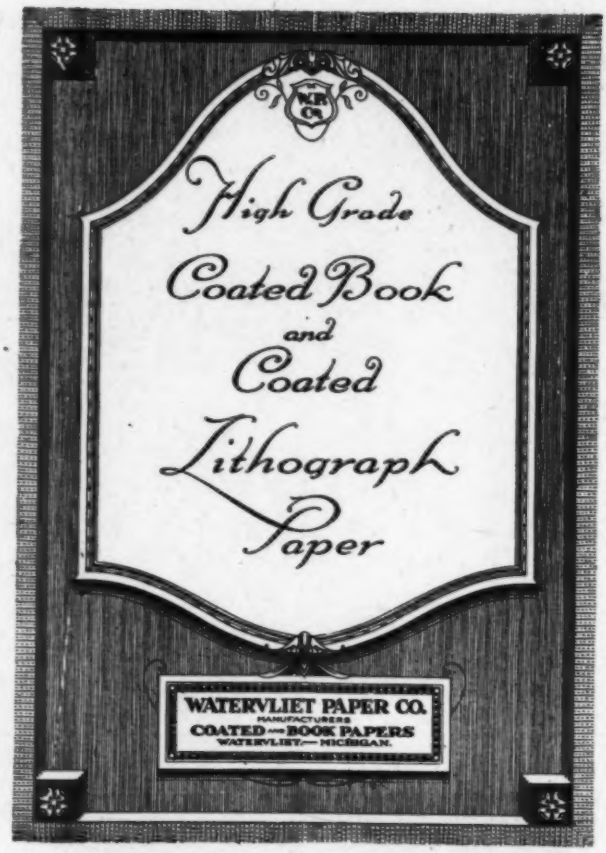
25

FOSTER SUPERHEATERS

At Your Service

K. V. P. BOND, WHITE AND COLORS
GENUINE VEGETABLE PARCHMENT
WHITE WAXED PAPERS
HOUSEHOLD SPECIALTIES

"World's Model Paper Mill" K V P Kalamazoo Vegetable Parchment Co. Kalamazoo, Michigan, U. S. A.



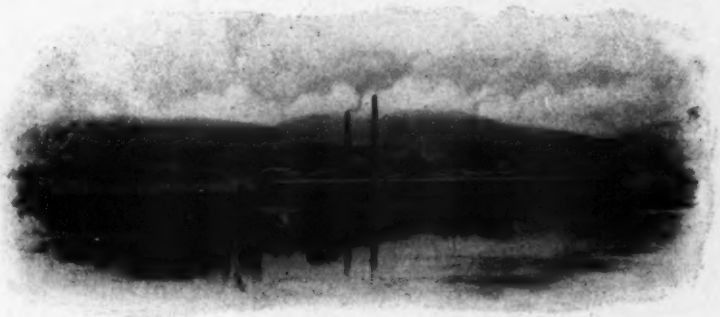
MUNISING PAPER COMPANY

MUNISING MICHIGAN

MANUFACTURERS OF

MUNISING M BOND

COLOR QUALITY AND UNIFORMITY
HAVE MADE FOR IT
AN ENVIABLE REPUTATION



Oxford Paper Company

Mills at
RUMFORD
MAINE

Executive Offices
200 Fifth Avenue
NEW YORK

Manufacturers of

High Grade Machine Finish and Super-Calendered Book Papers

CAPACITY OF MILL, 300 TONS OF PAPER PER DAY

Nashwaak Pulp & Paper Co. Limited

Manufacturers of

P

Canadian Bleached Sulphite

Mills: St. John, N. B., Canada

GENERAL SALES OFFICE
200 Fifth Avenue NEW YORK

Maine Coated Paper Co.

Manufacturers of

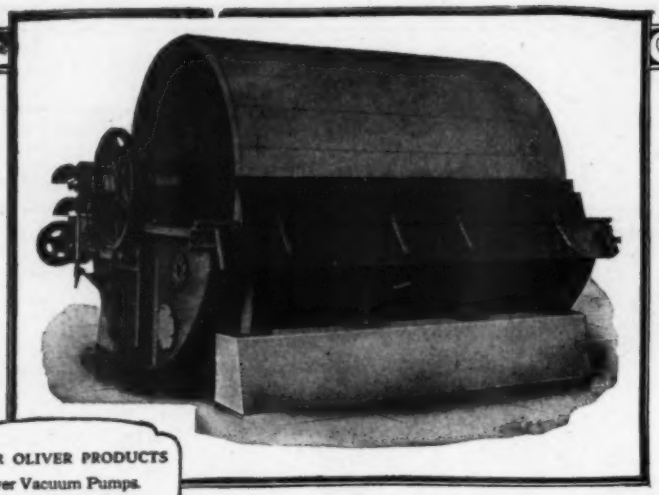
Polar, Hi-Tone and North Star Coated Book Papers

ALSO

Coated One or Two Sides Lithograph and Cover

Mills: Rumford, Maine

New York Sales Office: 200 FIFTH AVE.



OTHER OLIVER PRODUCTS
Oliver Vacuum Pumps.
Oliver Air Compressors.
Oliver Centrifugal Pumps.
Oliver Worm Gear Speed Reducers.
Olivite Acid-Proof Centrifugal Pumps.

The OLIVER is chosen for Modern Paper Mills

Oliver Continuous Filters are being installed in the new mill of The Northwest Paper Co., at Cloquet, Minn., for which George F. Hardy is Engineer.

Two Olivers will be used for pulp washing, and two for handling lime mud in the causticizing department.

Olivers are chosen because they insure low production costs.

Full information can be secured from our nearest office on the uses of Olivers in pulp and paper mills. In writing us please indicate which of the following processes you are most interested in, viz:

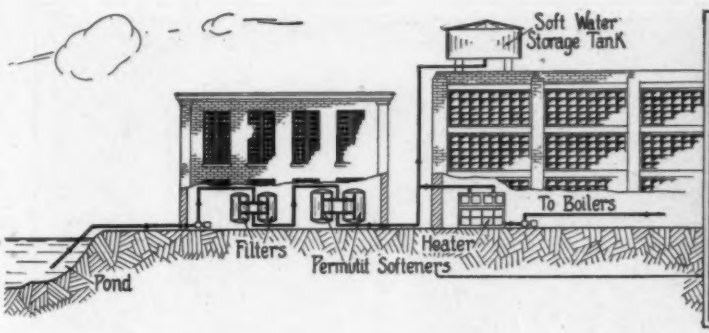
1. **Washing black liquor from digested soda or sulphate pulp.**
2. **Thickening pulp before bleaching.**
3. **Using the Oliver as decker and save-all, removing all fibre and filler from waste water.**
4. **Recovering caustic soda and dewatering lime mud in causticizing department.**

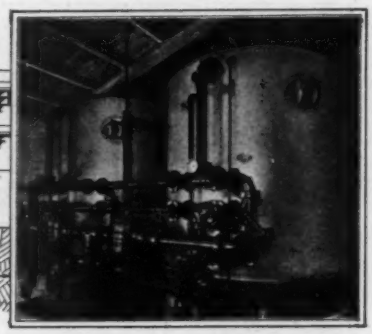
Oliver *Continuous* Filter Co.

San Francisco
503 Market St.

New York
33 W. 42nd St.

London
11-13 Southampton Row, W. C.





Only One Boiler Tube Replaced in 22 Boilers Since 1919

The power plant of a large, nationally-known manufacturer in New Jersey consists of 22 boilers delivering 5,000 H. P.—normal rating, 24 hours per day.

The water supply is derived from a pond and contains an average of 10 grains of hardness per gallon with considerable suspended matter.

During many years, this plant was put to great expense by the continuous formation of scale, sludge and mud in the boilers that boiler compounds seemed powerless to prevent. Scale deposited so rapidly that each boiler had to be cleaned and turbined every four weeks. The costs for repairs and labor were very high.

In 1919, after a searching examination of every water softening system on the market, they installed Permutit Water Softening Equipment that removes absolutely all hardness and mud from the boiler feed water.

All boilers and auxiliary apparatus are now absolutely clean and free from scale. A saving of 25% has been effected in boiler plant labor and repair bills, and a very substantial fuel saving has been made. A recent report from the general superintendent stated in part:

"We can say that the Permutit system has been more than satisfactory. We have B & W boilers which were put in about the time the Permutit System was installed and we have never had a tube cleaner in them. The saving due to this fact alone is quite a large item, but the large item, of course, is the efficiency of your boiler due to having absolutely clean tubes at all times. As a result of this, during all the time that we have been operating these boilers, we have only had to remove one tube, which was due to an imperfection in the tube itself."

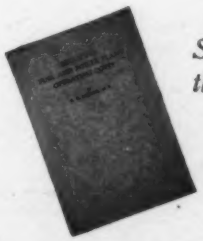
We can solve YOUR problems as we have solved thousands of others. Send for our booklet today.

The Permutit Company
440 Fourth Ave. New York

Zeolite Water Softener Patent Sustained

The Federal Court at Buffalo (Hazel, J.) on June 15th, 1921, handed down a decision sustaining our broad patent covering Zeolite Water Softeners which has been affirmed by the Court of Appeals. According to this decision all Zeolite Water Softening Apparatus on the market not made by us is an infringement of this patent.

No need to borrow trouble — buy Permutit—it is the best anyway.



Send for this free booklet

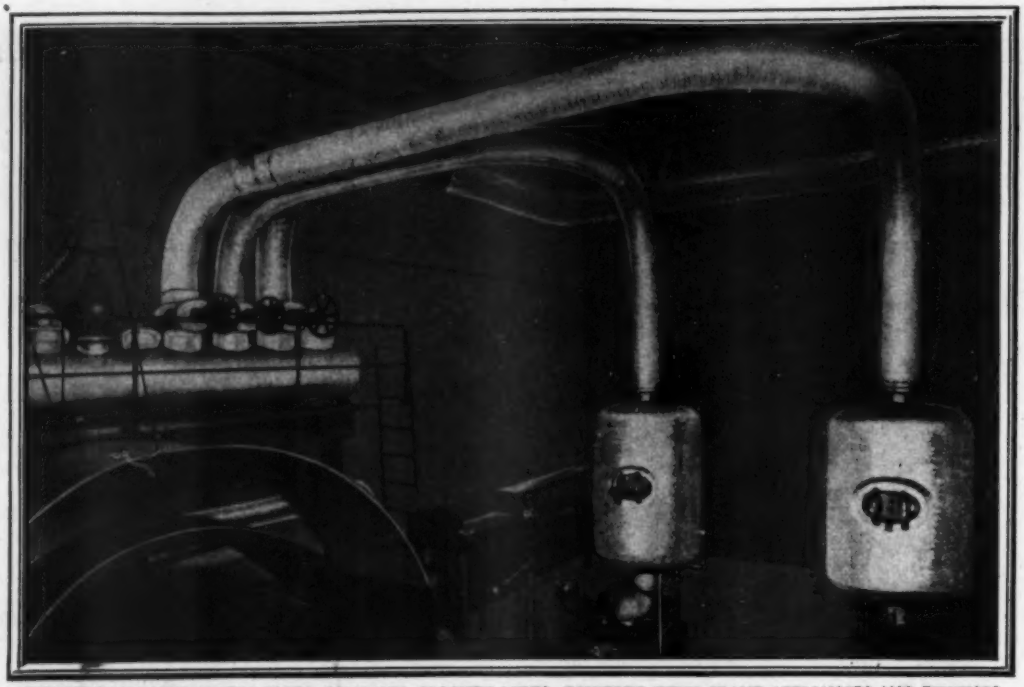
The Permutit Company
440 Fourth Ave.
New York

Please send me your free booklet, "Reducing Fuel and Boiler Plant Operating Costs."

Name _____

Address _____

Company _____



ENGINE ROOM, NORTHWEST PAPER COMPANY, CLOQUET, MINN., EQUIPPED WITH CRANE APPLIANCES AND FITTINGS

TO INSURE UNINTERRUPTED PRODUCTION

Maximum paper mill production is dependent on an unfailing supply of live steam to the digesters and uninterrupted delivery of power. In planning power plants for this service, prudent engineers specify equipment of efficient design and demonstrated endurance. Crane steam specialties and Crane valves and fittings satisfy the most exacting pipe-line requirements. Correct design, the selection of suitable materials, high manufacturing standards and thorough factory tests assure in Crane power plant appliances, valves and fittings the longest possible life with a minimum of operating delays for repairs and replacements.

CRANE

GENERAL OFFICES: CRANE BUILDING, 836 S. MICHIGAN AVE., CHICAGO

Branches and Sales Offices in One Hundred and Thirty-five Cities
National Exhibit Rooms: Chicago, New York, Atlantic City
Works: Chicago and Bridgeport

Nordberg Uniflow Engines
are especially suited for paper mill drives, because
1. They maintain exceptional economy over wide ranges of load.
2. They utilize any steam pressure and superheat.
3. The exhaust steam is comparatively free from oil.
4. They can be operated either condensing or non-condensing, with any desired back pressure.
Write for our Bulletin RY-1. Nordberg Engineers will gladly confer with you on your special problems
Nordberg Manufacturing Company
Milwaukee, Wisconsin
NORDBERG

The Coming Consolidated Paper *and* Pulp Mill Catalogue

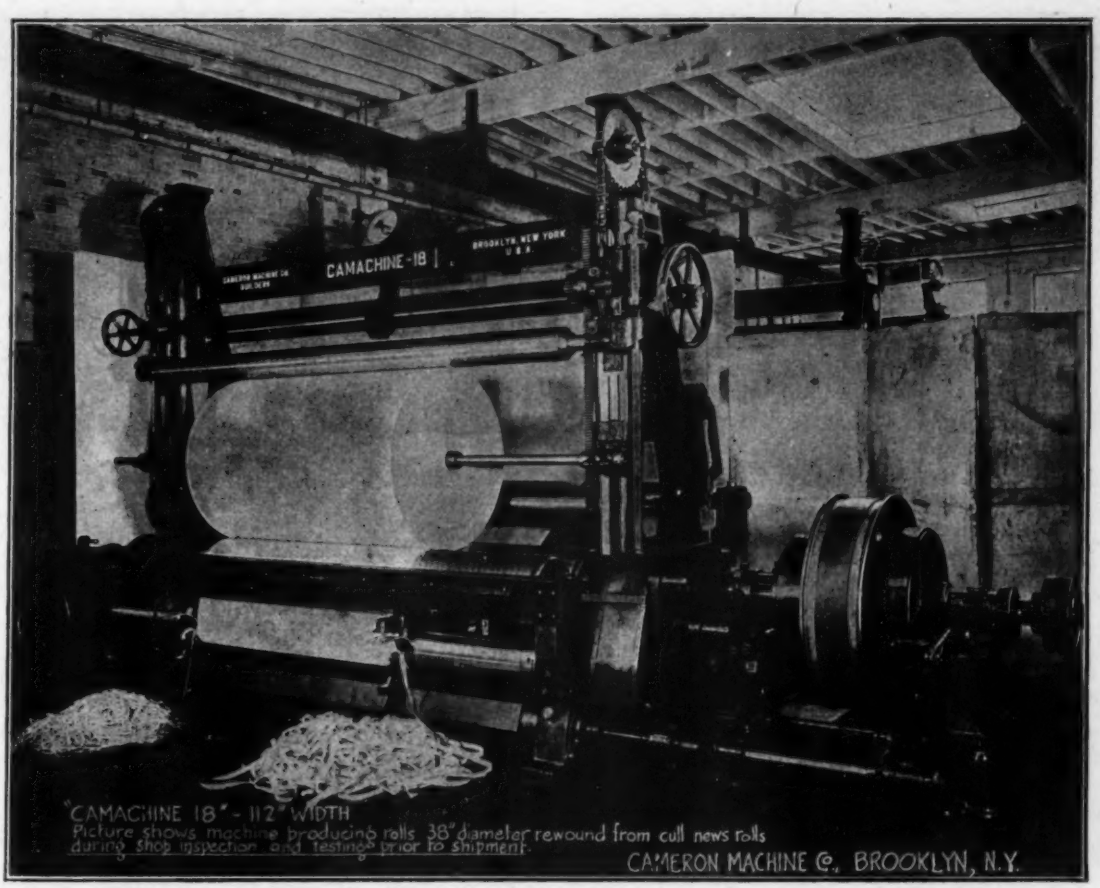
EVERY manufacturer of Paper Mill Machinery, Equipment, Supplies, Chemicals —in fact anything that can be sold to a Paper Mill—should see that his complete listing is sent to us immediately, so that every name will appear under its proper heading.

This book is being produced for the helpfulness it will give to manufacturers of paper and pulp, and will be presented to every mill on this continent.

In order that it may be as complete as possible, and thereby of the greatest service to manufacturers, we need the help of everyone who has anything to sell to these mills. Therefore, these listings should be prepared immediately and forwarded to us.

To those paper manufacturers who have made inquiries as to when this volume will be ready, and noted their desire to receive copies, we wish to say that all requests are being filed and will be filled as soon as the book is completed, which will be shortly after the first of the year.

PAPER and PULP MILL CATALOGUE
356 Monadnock Building
Chicago, Illinois


CAMACHINE-18
BROOKLYN, NEW YORK
U.S.A.
"CAMACHINE 18" - 112" WIDTH
Picture shows machine producing rolls 38" diameter rewound from cull news rolls
during shop inspection and testing prior to shipment.
CAMERON MACHINE Co., BROOKLYN, N.Y.

The ability to save labor and waste is the one vital point in judging the merits of a machine.

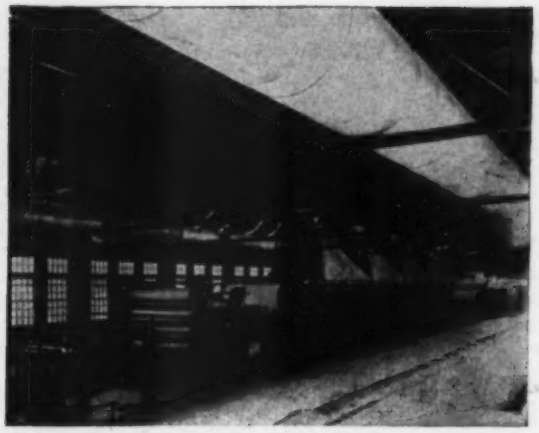
CAMERON Slitting and Roll-Winding Machines ("CAMACHINES") of the type and sizes for the work required have been developed from a special study of labor and waste-saving problems.

We place at your service the experience gained by more than twenty years devoted solely to the development of machines and processes for slitting and rolling all sorts of materials required in the form of rolls or coils.

Machines of the type and size recommended by the Company for handling the work the customer requires are usually quoted subject to practical trial prior to acceptance.

Over 1400 "Cameron Principle" Machines in Use

CAMERON MACHINE COMPANY
61 POPLAR ST. BROOKLYN, NEW YORK



This view shows a typical paper mill equipped with ventilating pipes and ducts.

This view shows how the same mill appears with the ducts removed after installing Skinner Heaters.

Steam and Drippage Eliminated— No Canopies Needed

Install Skinner Bros. (Baetz Patent) Heaters and you can take out all canopies, pipes and ducts and still your mill will be properly warmed and totally free from steam, vapor and drippage!

One mill, where the drippage was unusually severe, was described "dry as a bone" after the Skinner System was installed. In a mill in Maine there was no drippage present even with the temperature 40° below zero. In another mill where the steam was so thick that it was impossible to see 8 or 10 ft., the air was as clear as a well ventilated office.

Positive in Operation—No Pipes or Ducts Used

The Skinner Bros. (Baetz Patent) Heater—the pioneer of its type—is simple and positive in operation. Air within the room, as well as from outside, is drawn into the heater by a powerful fan, warmed to a point where it holds moisture in perfect suspension and then forced out under gentle pressure through ventilators in the building.

Humidity is reduced to normal, and comfortable, healthful working conditions are continually maintained.

Used by Leading Paper Mills—Fully Guaranteed

Skinner Bros. (Baetz Patent) Heaters are used in many paper mills where steam or drippage elimination, air conditioning or heating offers a problem. Among them are:

Crocker-Burbank Co., Fitchburg, Mass.
Certainteed Products Corp., East St. Louis, Ill.
International Paper Co.
Mt. Vernon Strawboard Co., Mt. Vernon, Ind.
Terre Haute Paper Co., Terre Haute, Ind.
Bulis Mfg. Co., Vincennes, Ind.
American Paper Products Co., St. Louis, Mo.
United Paperboard Co., Main Offices, New York City. Installations in 12 branch mills.
Fairfield Paper Co., Baltimore, Ohio.
Castanea Paper Co., Lockhaven, Pa.
Dresden Paper Co., Dresden, Ohio.
Auglaize Box Co., St. Mary's, Ohio.
New York and Pennsylvania Co., Johnsonburg, Pa.
Adams Paper Co., Wells River, Va.
J. Strange Paper Co., Menasha, Wis.

Skinner Bros. (Baetz Patent) Heaters are fully guaranteed when installed as directed by our engineers. Write for further information.

SKINNER BROS. MFG. CO., Inc.

1444 So. Vandeventer Ave., St. Louis, Mo.

Factories: St. Louis, Mo., and Elizabeth, N. J.

Boston, 465 Little Bldg.
Buffalo, 722 Morgan Bldg.
Chicago, 1723 Fisher Bldg.
Cincinnati, Ohio.
Cleveland, 632 Marshall Bldg.
Detroit, 328 Scherer Bldg.
Kansas City, 347 Lee Bldg.
New York, 1722 Flatiron Bldg.
Pittsburgh, 8 Wood St.
San Francisco, Monadnock Block.
Spokane, 429 First Ave.
Washington, D. C., 734 Evans Bldg.

Skinner Bros.

Baetz Patent HEATING SYSTEM

Serving the Customer

An Integral Part of Planning

BY H. M. GRASSELT

THE wonderful progress our industries have made in the last decades necessitated and has brought forth the development of one of the foremost fundamentals of modern business administration, viz, methodical planning, and the Planning Department has consequently become an indispensable and vital part of large industrial organizations.

The planning department may be compared to the general staff of an army. To carry on and successfully end a campaign, battles must be planned in advance; the operations of the various units must be mapped out and their actions wisely predetermined, so that they may act as an entirety and attain the results desired.

Similarly, the success of any industrial enterprise will depend upon systematic planning. The point in view is to realize maximum results, control operations in all phases without difficulty and complete a task within a certain time.

In large plants, the planning department is in charge of a manager who is thoroughly familiar with the equipment, capacity and adaptability of the establishment and realizes the significance of the word "Service." His duties embrace material control, production control, laying out and carrying out of work and following up of sales orders.

Since many paper mills and board mills are not large enough to establish and support a separate planning department, all work along its lines is here usually vested in one man—the order clerk. He will attend to the most important ramification of planning, that of rendering service to the customers by following up of sales orders and getting the goods out in specified time.

Following Up of Orders

Service is the keystone to industrial success and to obtain this end, promises made to customers must be kept. This necessitates bringing the various units into close co-operation, working out details in advance, so that operations may be carried on without interruption or confusion. To keep promises made by the sales department, requires the full support of the factory, and to run the latter to advantage with its supply of orders, requires careful scheduling of the order and time at which the work is to be done.

Planning was rather superfluous from the latter part of 1920 until a few months ago, for there were no orders on hand to plan upon. It is comparatively easy to plan in times when sales and out-put are uniformly maintained at full capacity and perhaps a few unfilled orders ahead. However, in times when mills have unfilled sales orders for three months or more on hand, definite running schedules must be made and the entire sequence of make-orders laid out. It is in such periods, that the order clerk's duties require his full attention. He is the connecting link between the sales and manufacturing departments and his chief problem is to insure the methodical making of orders and their deliveries as promised.

In the days of yore, many things were carried "under the hat," instead of in written records. Modern methods require written records, properly kept and filed. Even so, the order clerk is not burdened with many forms and red tape, just a few are quite sufficient to enable him to successfully plan and complete his tasks.

The Acknowledgment of Orders

A form letter similar to the interspersed specimen, Fig. 1, will meet the requirements. It is made out in duplicate and bears serial consecutive numbers—the sales order number. The original should be mailed to the customer immediately after receipt of the orders.

(Letterhead)

Sales Order No.....

Date:.....

M.....

.....

Gentlemen:

Your order No....., of.....

has been entered according to the following specification.

Item	Quantity	Grade. (Watermark, etc.)	Color	Size	Wt.	Basis Wt.	Price	

The goods will be shipped.....

To .....

.....

Via..... Prepaid—Collect.

Terms of Sale:

This order, for which we thank you very much, is accepted subject to delays brought about by accidents, fires, strikes, railroad embargoes and contingencies of any character beyond our control.

Very truly yours

Fig. 1—Actual Size: 8½x11.—To be made out in duplicate.

The duplicate is to be filed away in the tickler, which may be divided into "Make Tickler" and "Shipping Tickler." The copy is put into the former and when the day arrives on which the work is started, the record appears automatically and is transferred into the shipping tickler and filed according to shipping promises.

The Production Order

Each make-order should be covered by a machine or production order, which may be made out in sets of four copies, bearing serial consecutive numbers.

Copies No. 1 (the original, Fig. 2) and 2 are to be given to the superintendent, who in turn will insert in No. 1 any instructions for the machine tender and hand it to him when that particular order is to be run on the paper machine. Copy No. 2, the beater room order, is sent to the beater room. Its lower part is ruled and divided into two parts, similar to copy No. 1. At the left hand, the superintendent will enter what raw materials and supplies and in which quantities they are to be used in the run. At the right, columns are provided for the entry of the actual quantities of rags, paper stock, sulphite, ground wood and other materials (size, alum, filler, color, etc.) used.

Date Ordered:..... Date Promised.....

Production Order No.....

To be made..... Grade..... Sales Order No.....

Mach. No..... Watermark..... Customer's No.....

Color.....

Item	Quantity ordered	Machine Size	Finished Size	Fin. Wt. 500 Sh.	Running Weight	Basis Wt.	Pounds to make

Made for .....

.....

Machine Directions:	Quantities made					
	Date	Item	Rolls	Pounds	Broke	Made by
Machine Sizing:						

Fig. 2—Actual Size, 8½x11—To be made out in quadruple.

Copy No. 3 is to be given to the finishing room. It contains instructions about finishing, counting, trimming, packing and shipping of the lot. Its lower part is also ruled similar to copies No. 1 and 2. Several columns are provided for the entry of rough paper received from the paper machine and paper finished, there are also columns for the entry of reams of "Perfect" and "M's" in actual and nominal weights and one column for "Broke."

Copy No. 4 is to be retained in the office. Its lower part is ruled into columns for the compilation of costs. (A minute description of the purpose of these forms in regard to cost finding is not within the scope of the present article and, therefore, the subject will be treated separately in a later issue.)

The order clerk will make out the machine orders immediately after receipt of the customer's order and determine and enter the date of promise of shipment.

Running Schedules

The production orders then will be compiled in a running schedule, covering at least a period of one week, preferably two or even three weeks if sufficient unfilled orders are on hand. The list will show production order numbers, grade, quantities and time to be made. It is obvious that all orders for a certain grade and color are to be run together.

The original of the running schedule is submitted to the superintendent and the duplicate retained in the office.

It is, of course, imperative that the superintendent and order clerk work in perfect harmony. These two men have to work out the running schedule with utmost care, determine starting time and time the goods will leave the mill, allowing sufficient time for finishing and not forgetting making provisions for emergencies.

With the data available, customers can be given definite shipping promises. If the promise cannot be kept for one reason or other, customers have to be informed immediately.

It is evident that the traffic department plays an important part in planning; it has to secure transportation facilities, order empty cars in time to avoid delay in shipping and arrange other details pertaining to shipments.

Wise planning will insure service and bring about co-operation among the various units. No industrial enterprise can afford to neglect planning—one of the fundamentals of successful administration.

Thou shalt guard thyself with all diligence; this is the first and greatest commandment of Safety First. The second is like unto it: Thou shalt guard thy neighbor as thyself, says the National Safety Council.

The Safe Finishing Room

BY CHARLES E. WALKER
Eastern Manufacturing Company, Bangor Me.

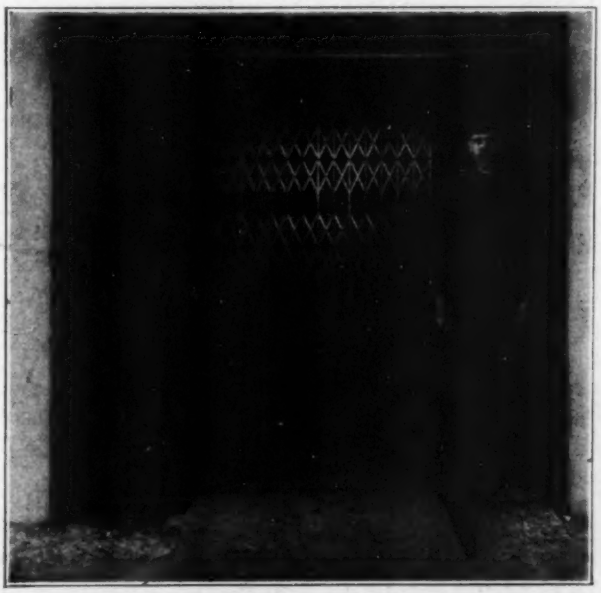
THE finishing room of the modern paper mill contains a more diversified assortment of finger crushers, arm removers, and bone breakers than any place of its size, in any large industry in the world.

Safety engineers, experts, and insurance inspectors are inclined to fall into a rut regarding safety work; they make frequent inspections, with minute attention to machines, but do not pay sufficient attention to basic causes.

The intelligent study of psychology—not mind reading nor the many present day psychic secrets—in its practical form will develop a few thoughts that are likely to be thrust aside in the enthusiasm for Safety First.

Let us all take up in detail some of those accident factors which I call basic causes. What are the senses?—Hearing, seeing, touching, smelling and tasting. Is it not true that every accident might be avoided through the development of these senses in the individual worker, or some other worker? Are we not wrong, then, if we presume to fight accidents from any plane above that of the original senses?

The general tone of the physical man or woman makes a most profound difference with the eye, the

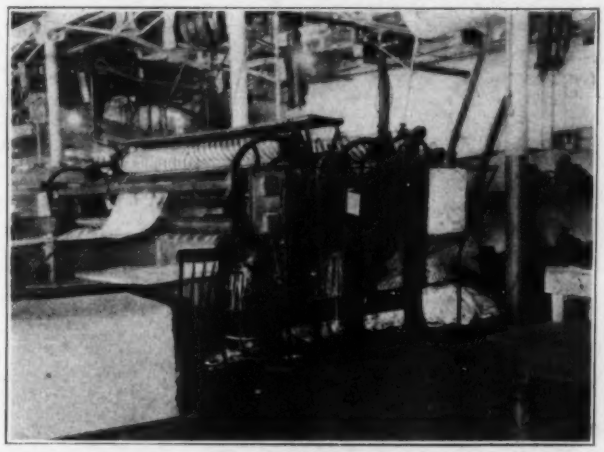


Collapsible gates at each side of elevators remove one big accident hazard

ear, the tongue, the nose, the fingers, and their use; we will, therefore, assume that the first step in the elimination of accidents is the building up of the general nervous system of the worker.

The employer can do many things which have all been covered in detail in books and articles. A few of the essentials are first, an adequate supply of pure water; second, a good lighting system; third, rest periods and rest rooms; fourth, cleanliness.

It is obviously unfair to ask employees to work at dangerous machinery in an overheated, exhausted condition; it is even criminal to require the workmen



Wire mesh guards on cutters put a safety device where it is badly needed

to work in a badly lighted room; it is eminently human, as well as efficient, to permit workers, especially piece workers, to have rest periods; it is also a right of the working man to be able to go home clean to his dinner or supper.

Strong, healthy employees should be assigned to work at or near finishing room machinery—employees passed by the doctor at nearly 100%. There has been a tendency in the past to relegate the lame, the halt, and the blind to the finishing room. This is a grave error, as there is every chance in the world that the ordinary old employees, whose eyes or ears are not strong, will be hurt.

Let us assume that we have physically fit working force distributed about the finishing room, and that they are reasonably clean and comfortable, mentally and physically. We have thus eliminated many chances for injury, but must go still further.

We will start at the beginning of the finishing room and observe the various opportunities for compensation. The very first place where accidents are liable to occur is at the junction of the machine room and the cutter room. This point should have danger signs posted to notify people of trucks coming from the machine room loaded with heavy reels or rolls. Good strong light must be provided so that incoming reels may be immediately observed. Usually heavy, empty reels are stored somewhere adjacent to the machine

room in the finishing room. Great care should be taken to perfect the storage system so that reels cannot drop while being hoisted, or after having been stored.

There are three main dangers on the cutters; the knives cannot be guarded in such a way as to make them foolproof, so it is imperative to have ironclad rules for keeping men from the top of the cutter or from making adjustments while the machine is in operation; there is always the danger of helpers,

Accidents in the plater room are diminished by the use of guards on plater and main line drives

feeding reels or rolls, getting caught by the arms and pulled over the rolls, which is not usually serious, but may be so; also, the gears should be well guarded so that the girls will not have their hair caught. Paper broke should never be allowed to lie on the floor covering truck handles, bits of wood, and the usual assortment of odds and ends which seem to be present in most finishing rooms.

The plater room possibilities for accidents are remarkable. Metal forms should be very carefully watched to keep the plater girls' hands safe from cuts. Plater floors should be kept in good condition so that men and girls will not stumble when shifting about. The platers themselves should have all gears carefully guarded, and a safety control lever should be accessible to anyone in the case the plater man gets his hand caught in the plater. There is very little chance of this happening if the plater man does not wear old ragged gloves while handling his forms. Swing tables must be kept tight so that forms will not fall in transit.

The best method of guarding sheet calenders is by building the tables large enough to keep the ordinary person away from the rolls and belting. Super calenders are one of the most dangerous pieces of finishing machinery, and probably have accounted for as many fingers, as the paper machine itself, in proportion to the number in use. There are only two satisfactory methods of preventing crushed fingers on this machine: by having highly intelligent men running it, and by careful instruction in putting paper through without poking it with the ends of the fingers, as is the usual custom among the war trained finishers.

Half Stuff

Some mischievous youngsters tossed a cat in through the beater room window one evening. The furnisher, from a platform above, saw it splash into the moving pulp. And before the carcass could be recovered it had been cut into a thousand pieces. In a great state of excitement he told the beater engineer what had happened. "That's all right," calmly returned the boss of the beaters, "just hold that beater until morning, the machine is going onto catalog paper."

The strikers have exerted a mighty effort to take the "coal" out of Columbia.

He was a green lad from the country. Had never worked on a machine before. During his first week he had been sent in quest of the "left hand monkey-wrench" also the "paper strecher". Yes, he was very green. The machine tender one day handed him a large, heavy wooden bucket and asked him to take it over to mill No. 2 and get a bucket of "suction". The green one hesitated. "I think you are trying to play a joke on me," he slowly remarked, "isn't there a suction box on your own machine?"

The paper manufacturer, at least, puts a good deal of "stock" in what he makes.

Her husband, a mill mechanic, had a caller on the back steps. She caught only an occasional word of their conversation. "....test'er...." "....yes, beat'er down...." "Dry'er....boil'er ...." "....finisher...." The men who had been "talking shop" heard a screech as the poor woman fled through the front door.

We understand there is considerable dickering over rags. Sort of "chewing the rag", as it were.

Power Plant Management

Combustion of Fuel Oils—Part II

By ROBERT JUNE, M.E.

LAST month we discussed oil versus coal for boiler furnaces, advantages and disadvantages of firing fuel oil, types of burners, oil-feeding systems, etc., and enumerated certain precautions to be observed in the combustion of oil. Continuing our discussion we come first to:

Furnaces for Burning Oil Fuel

The design of the oil-burning furnace is more important than the type of burner. In candescent brickwork around the flame is desirable, but where this is impossible, the next best arrangement is that of using a flat broad flame, burning close to a white hot checkerwork floor through which the air is continuously admitted. The path of the flame in the furnace must be such as to insure a uniform distribution of heat over surfaces of the boiler without any direct flame impingement.

Under no circumstances should the flame extend into the tube. The best arrangement is one where the furnace is located under the first pass of the boiler. With this arrangement the heating surfaces of the boiler readily absorb radiant energy from the incandescent fire brick. Arches, target walls, and similar constructions are not satisfactory and may prove quite dangerous on account of localization of heat. This localization may cause the burning out of tubes, or bagging of shell, to say nothing to limiting the capacity of the boiler.

Soot Deposits in Oil-fired Boilers

The soot deposit resulting from the combustion of oil is in the nature of a pure carbon mixed with a slight amount of oil. It is somewhat fluffy in appearance and adheres readily to the tubes, but is easily cleaned and removed from the boiler under the operation of a steam jet. It is entirely different in character from the soot resulting from combustion of coal on account of the absence of ash, etc., and the presence of greater or less quantities of unburned oil, which, going through the boiler, tend to deposit on the tubes in combination with the soot. If this formation is not removed at regular intervals, it soon crystallizes or carbonizes on the tube and must be scraped off with rods or bars.

Soot deposits from oil-fired furnaces have a much greater insulating effect than those occurring with coal-fired furnaces. There are two reasons for this: first of all, the deposit is in the nature of a pure carbon which has greater insulating properties than various ash constitutents found in soot from coal; second, the deposit being of a somewhat fluffy adhesive nature, is usually found to envelope the entire tube as compared with coal deposit, which usually consists of soot, dust and ashes building on top of the tube and leaving the underside more or less clean.

For some time after oil came into use for boiler furnaces, the impression prevailed that oil-fired boilers did not require as frequent or as thorough cleaning as coal-fired. The efficiencies of oil-fired boilers were generally higher than those obtained where coal was used as fuel, due to more perfect combustion with a smaller quantity of excess air, and this improvement was for some time accepted on its face value as the best obtainable.

With the increasing use of oil as fuel in the past few years, it was inevitable that detailed tests should be inaugurated of the performance of oil-fired boilers with and without mechanical soot blowers.

These tests developed the fact that mechanical soot blowers are absolutely essential to the development of the highest efficiencies on oil-fired boilers.

As an example attention is called to the results of the following test by the Pacific Gas & Electric Company:

Test Data Before Using Soot Blowers

Time	Temperature		Load
A. M.	Stack	Sup. Steam	Meter
10:15	550	500	4.2
10:30	550	502	4.0
10:45	555	498	4.0
11:00	557	498	4.1

Test Data After Using Soot Blower

Time			Load
P. M.	Stack	Sup. Steam	Meter
2:30	485	495	4.2
2:45	485	506	4.0
3:00	485	504	4.3
3:15	485	505	4.2

Test Results	Before	After
Load Meter	4.075	4.175
Per cent rating	101.88%	104.38%
Steam Pressure Gauge	199.5 lb	200.75 lb
Superheated steam temperature	499.5° F.	502.5 ° F.
Stack temperature	533.0° F.	483.75° F.

These results show that the soot blowing caused the temperature of the stock gases to fall from 553 degrees F. to 483.75 degrees F., making a difference of 69.25 degrees F. or 13.05%.

"Also the temperature of the superheated steam was raised from 499.5 degrees F. to 502.5 degrees F., a raise of 3 degrees of 0.6%.

"The direct effect of the use of Soot Blowers is saving in fuel of 3.9%."

The Texas Company, Port Arthur, Texas, found a saving of 5.5% fuel by the use of mechanical soot blowers and as a result ordered equipment for thirty oil-fired boilers. As this company is in the oil-pro-

ducing business, its action is particularly illuminating.

These tests were followed by others at some of the large Western Central stations. On one of these, the boiler, a large Stirling, was taken off the line and the tubes, super-heated, etc., washed clean. The boiler was then fired up and an evaporation rate of 37,000 pounds of water per hour and 14 per cent CO_2 was maintained. At the end of twenty-four hours the soot blowers were operated and were used for twenty-four hour periods for the remainder of the test, with the equipment. During these tests, readings were taken at fifteen minute intervals of the Water-rate, CO_2, Draft, Oil and Superheat. When using the blowers the flue temperature dropped to 525 degrees and rose to 540 degrees in about fifteen minutes. It ranged around 540 degrees for about sixteen hours and then gradually crept up to 590 degrees at the blowing period, when it again dropped to 525 degrees. This was the regular daily performance throughout the test while using the blowers.

At the end of a seven-day period the boiler was given a final blowing and thereafter operated under the usual condition; i. e., without any cleaning at all. At the end of the first twenty-four hours' run the temperature had risen to 590 degrees; at the end of the week it had risen to 680 degrees; and at the end of ten days had risen to 720 degrees, at which point it seemed to hold. But they were not able to maintain the evaporation rate, which dropped to 34,000 pounds per hour. The saving effected by soot blowers amounted to 6 per cent.

Despite the war emergency, with its constant urge to speed rather than to thoroughness the Emergency Fleet Corporation made some very detailed tests of Diamond Soot Blowers before adopting them. These tests were conducted at Burlington, Iowa, under the direction of the Bureau of Mines.

The boiler selected was the Foster Marine Water Tube, and was one of a large number then built by the Murray Iron Works, of Burlington, Iowa, for the Power Specialty Company of New York for delivery to the Corporation. The tests extended over a period of a number of weeks and covered a wide variety of operating conditions and drafts.

In addition to proving the necessity of soot blowers to economical operation, the tests threw some important light on soot-blower construction. For instance, in boilers burning fuel oil, draft conditions are very low, running from .02" in the furnace up to .08" in the uptake. If soot blowers were so designed that all nozzels emitted steam at the same time a curtain or blanket of steam would be ejected into the boiler at high velocity, with the result that it would either put out the fire or materially interfere with the draft. The bad effects of interfering with the draft can hardly be overstated. As a result of such a condition all of the factors in the operation of the boiler became unbalanced. This applies to the feed of oil to the furnace, the maintainence of even steam pressure, and the injection of the feed water. In place of a normal, even operation, a condition of ebb and flow takes place which may last for an hour or more before conditions again become normal. Necessarily, this entails additional work on the part of the fireman who finds the whole routine and operation of the boiler room upset.

In order to take account of this condition, the soot blower for hollow staybolt boilers is made up in vertical sections, each under the control of its individual valve. This arrangement permits of blowing three or four vertical rows of tubes at one time, thus avoiding all interference with the draft.

On stationary boilers of the horizontal water-tube type, vertically baffled, and on vertical boilers, where revolting soot blower units are commonly used, the use of oil for fuel calls for little change in construction. Care is taken in locating the units to be sure that they blow with the draft. In addition, it is sometimes found advisable to stagger or offset the blower nozzles so that they do not all blow in the same direction at the same time. The mechanical soot blower for oil-fired boilers is here to stay, and the use of blowers on such boilers is fast becoming as common as the use of blowers on coal-fired boilers.

Specifications for Fuel Oil

The Bureau of Mines has prepared the following specifications for purchase of fuel oil for the Government which may with some modifications, depending upon conditions, be used by engineers generally:

"1.—In determining the award of a contract consideration will be given to the quality of the fuel offered by the bidders as well as the price, and should it appear to be to the best interest of the Government to award a contract to a higher price than that named in the lowest bid or bids received the contract will be so awarded.

"2.—Fuel oil should be either a natural homogeneous oil or a homogeneous residue from a natural oil; if the latter, all constituents having a low flash point should have been removed by distillation; it should not be composed of a light oil and a heavy residue mixed in such proportions as to give the density desired.

"3.—It should not have been distilled at a temperature high enough to burn it nor at a temperature so high that flecks of carbonaceous matter began to separate.

"4.—It should not flash below 140 deg. Fahr. in a closed Abel-Pensky or Pensky-Martens tester.

"5—Its specific gravity should range from 0.85 to 0.96 at 59 deg. Fahr., the oil should be rejected if its specific gravity is above 0.97 at that temperature.

"6.—It should be mobile, free from solid or semi-solid bodies, and should flow readily at ordinary atmospheric temperatures and under a head of 1 foot of oil, through a 4-inch pipe, 10 feet in length.

"7.—It should not congeal or become too sluggish to flow at 32 deg. Fahr.

"8.—It should have a calorific value of not less than 10,000 calories per gram (18,000 B. t. u. per pound); 10,250 calories to be the standard. A bonus is to be paid or a penalty deducted according to the method stated under section 21, as the fuel oil delivered is above or below this standard.

"9.—It should be rejected if it contains more than 2 per cent water.

"10.—It should be rejected if it contains more than 1 per cent sulphur.

"11.—It should not contain more than a trace of sand, clay or dirt.

"12.—Each bidder must submit an accurate statement regarding the fuel oil he proposes to furnish. This statement should show:

"(a)—The Commercial name of the oil.

"(b)—The name or designation of the field from which the oil is to be obtained.

"(c)—Whether the oil is a crude oil, a refinery residue or a distillate.

"(d)—The name and location of the refinery, if the oil has been refined at all."

Putting a New Wire on the Fourdrinier

By HARRY WILLIAMSON
The Northwest Paper Company, Cloquet, Minnesota

FROM a study of the accompanying detailed description, the reader will understand that extreme care must be used at all times while handling the wire: (a) The wire is endless; (b) It is woven to form a mesh of 60 or 70 to the inch; (c) Owing to the composition of the metal wire from which it is woven, the wire is not elastic; (d) In its operation the wire must preserve an absolutely smooth, unwrinkled surface; (e) The wire is the mold on which the paper is made.

It, therefore, becomes apparent that:

(a) All rolls and stationary parts whose position in operation is inside the wire must be taken out clear of the frame and replaced inside the new wire (the one exception being the bottom couch roll upon which the wire itself is slipped). The rolls which support the wire on its return journey can be left in position.

(b) Anything dropped into or onto a wire which will make a hole in the fabric larger and different in shape to the formation of the mesh will damage the wire and probably spoil it altogether.

(c) Any strain must be distributed evenly over the whole width of the wire to prevent undue stress on any group of strands.

(d) Any action, such as raising one side of the wire without raising the other, or allowing the edges of the wire to hang on the frames with the centre sagged down, will cause a wrinkle or buckle and must therefore be avoided.

(e) To sum up: Any wrinkle, buckle, strain or hole made in the wire will be recorded in the web of paper made on it.

Taking Off Old Wire and Stripping Frame Ready to Receive New

Many methods of stripping and putting on wires are in force, depending mostly on the equipment of the mill, the make of the machine and the individual ideas of the man in charge of the operation.

The following description is simply to give the reader an idea of how it is done, and is based on the assumption that the mill is a "modern fast news" fully equipped with powerful overhead crane, and wire accessories as detailed in a previous section.

It is also assumed that two complete machine crews are in attendance as well as the gang of helpers usually known as "swipers."

The work of stripping can then be allocated as follows, each gang working simultaneously: One complete machine crew responsible for removing the old wire, the suction boxes and rails, squirt-gun rail, foot-board and dandy roll, raising the top couch roll and bringing the new wire forward; the second machine crew taking up the deckle frames, removing the tube rolls, breast roll and automatic guide roll.

The swipers taking out the save-alls and rails, shower pipes and carrying rolls, besides generally helping either machine crew as desired.

As the old wire lays on the bottom couch roll, cut it on the edge in two places about one inch apart, and tear the strip across the whole width. The bottom half of the wire will then drop down to the wire pit.

The machine tender operating the starting lever while the rest of his crew take hold of the edge of the wire resting on the bottom couch roll, the clutch is stuck in gently and the couch roll revolved until the crew have about six feet of wire at their disposal. This they roll up towards them, and fold it back over the top couch roll until it rests against the guard-board lip. The clutch is then put in a little at a time until the wire is all rolled up, the crew removing the wire well clear of the machine and out of the way while the machine tender removes the weights and levers from the top couch roll so that it can be raised up.

An alternative method is for the machine crew to roll up the wire away from them until they have enough to rest between the bottom couch roll and the wet felt. The wet felt is then started at full speed, then run the wire slowly until the wire is all rolled up. Stop the wire, and when the wire has

stopped, stop the wet felt. Attention should be given to this point, because if the wet felt is stopped first the couch roll will push the rolled up wire down into the pit.

Now that the drive will be no longer required until the new wire is on, it is advisable either to shut down the main line or to remove the pin which connects the starting lever with the wire clutch, thus preventing a possible accident.

While these things are being done the second machine tender will be taking up the aprons, washing them off, and placing the angle irons, clamps, and corner pieces in a place of safety. The apron board should be carefully examined by him and any loose tacks, etc., removed. His machine crew working in pairs and both sides of the machine will raise the return deckle pulleys, remove the deckle straps and fold them back over the slices.

In doing this it is advisable to hook the front-side deckle strap over the adjusting screw on the back centre of the slice, while the back-side deckle strap is similarly hooked over the front centre adjusting screw. This prevents an undue amount of slack strap hanging down, which would be liable to damage the new wire on replacing the deckle frame.

While the above operations are going on a pipe-fitter should disconnect all hose-pipes connected with the showers and taps on the deckle frame, remove all couplings of inside shower pipes, and disconnect the pump attachments from the suction boxes. Also a swiper detailed to each of the lifting devices for the top couch roll, will raise this roll so as to give a clearance of about six inches. These two men should also remove the funnel-tubes which the water from the top couch roll.

The first machine crew having disposed of the old wire, can next turn their attention to the suction boxes. Working in pairs this work will be greatly facilitated by each pair using a small rope sling. One of the men hooking this sling round the handles of the suction box, passing a bar through the other end of the loop, bearing against the machine frame and taking the weight of the box whilst his partner removes the bolts. The box is then lowered onto its safety rails, and is ready to be pulled out.

While the swipers pull out and take the suction boxes to the millwrights to be planed, one pair of the machine crew removes the safety rails placing all together on the floor opposite the place in the frames where they fit.

Logical Order to Be Observed

The other pair of men remove the squirt-gun rail, dandy roll and foot board.

As the three last named are the last things to be replaced, it is a good plan to place them down by the dryers, with the dandy roll on the foot board. They are then clear of the work and there is much less chance of damaging the dandy roll.

With the removal of the shower pipes which play on the wash roll and wire, and also the two tube rolls which support the wire behind the dandy, this crew is free to get the new wire out of its box ready to bring forward. The two tube rolls just mentioned will be replaced in wire quite early, it is therefore best to keep them separate from the others. Another useful time saver is to replace the wire shower-pipe, letting it rest on the side frames of the machine about a foot behind the bottom couch roll. It will then serve as a foot rail when putting the new wire on the bottom couch, and can easily be withdrawn and placed in its brackets when it is no longer needed in this capacity.

The second machine crew meanwhile having hooked back the deckle straps, place the stiffening bar (which fits across the width of the machine over the wire), on the deckle frame, which is now ready to be hoisted clear and put on a couple of planks which have been laid across the screen vats in readiness.

Two men are enough for this job, it is done by means of the overhead crane and the grappling hooks. These grappling hooks are two-hooked steel arms attached to a steel ring—an arm being shorter than the other. In use the shorter arm is hooked onto the deckle frame at the pulley end, and the longer arm to the other end, the frame will then be horizontal when raised, the reason being that the point of balance of the frame is nearer the pulley end than the other.

Another point to be observed is that when lowering the frame on to the planks, which have been placed across the screens to receive it, care must be taken to keep the deckle straps from underneath. Otherwise, the weight of the frame will cut and seriously damage them.

The remainder of the crew with the help of some of the swipers remove the tube rolls, and as the tube-roll next to the suction is the last to be placed, it must be the first taken out. A convenient place to put the wooden frames in which the tube-rolls are to be stacked, is alongside the screens. Special care must be taken to stack the rolls in rotation exactly as they come from the machine, so that each roll may be replaced in its own position without confusion.

Proper Precautions to Be Observed

Great care must be taken when handling tube-rolls so as not to damage them in any way. This is of great importance. Remember that they are rolls which have been trued up with a perfectly smooth surface, to a true running balance. If one is bent, even slightly bent, it will no longer be in balance and will do much to spoil the appearance of the sheet of paper made.

Remember also that any burrs or roughnesses knocked up on the surface will do much towards spoiling the wire, as the tube-rolls are the principal support of the wire, and, of course, in direct contact with it.

To say that walking on some of the tube-rolls while

taking out the others is not conducive to maintaining the true running balance seems unnecessary, yet the writer has seen it done many times.

By this time the two men will have placed the deckle frame upon the screens and brought the crane back over the breast-roll, hooking the rope slings around the sling round the shoulders of the roll so as to leave the outside ends clear. The breast-roll is hoisted clear of the frame, and run out to the front side, where it is lowered so that the back side journal rests on the shake rail about two feet from the end. (See that the journal end does not protrude over the inside edge of the shake rail.)

The other journal is supported on a trestle stand specially made for the purpose. A wad of sulphite lap placed under the journals will prevent the breast-roll from slipping.

The hinged apron board is turned up and tied back to the head-box, and the hinged brackets on which this board rests are turned flat to the head-box, thus giving sufficient clearance for replacing the breast-roll in its bearings.

Meantime, the tube rolls are being stacked, this gang is pulling out the save-alls and their supports (placing them on the floor opposite their own stands), and also removing the inside carrying rolls and stretch roll, with their respective shower pipes, each roll being placed gently on the floor in line with its own place in the machine.

While the machine tender takes off the automatic guide device, the crane is pulled along until it is in position over the guide roll, the rope slings are passed around the shoulders of the roll and it is hoisted clear.

In taking this roll out care must be taken not to damage the small rod which is fitted onto the end of the front side journal, whose function it is to operate the automatic wire guide.

As the guide roll is the first roll to be replaced it can be left on the trolley, but must be taken clear of the wet end out of the way.

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

The Boiler's Flywheel

ONE of the stock jokes perpetrated in railroad shops is to tell the apprentice to "fix up the governor on the locomotive." The boys will have their fun.

Now, when I mention a flywheel on a boiler some readers may think I am "kidding" because, surely, a boiler has no moving parts and a flywheel always moves.

The function of the flywheel on a steam engine is to maintain as uniform a speed as possible. The heavier the flywheel the less the fluctuations caused by momentary forces acting externally or internally. The lighter the flywheel the worse the regulation. Great mass in the flywheel is therefore desirable because it more easily absorbs the shocks, absorbs energy, and gives up the energy again without apparent effort.

Flywheels are useful principally for fluctuating loads—not so much for steady loads. If a load is perfectly constant and if the driving force is a constant twisting force, a flywheel is hardly necessary. If the load is constant by the driving force is variable or irregular like a hit and miss gasoline engine a flywheel again is an essential.

In the steam boiler we have a similar condition. If the load on the boiler is irregular there is nothing better than a "large mass of water" in the boiler to serve as a "flywheel" for the boiler. The only difference is that instead of absorbing and giving up mechanical energy the water in the boiler absorbs and gives up heat.

For example, let us suppose that a certain boiler has been running normally for an hour or so and then, suddenly, there is an unusual demand for steam.

With ideal conditions the water level should be "normal." There should be sufficient water in the boiler to take care of this "peak load" for a while **with a reduced rate of feed.** The rate of feed should be reduced so that all of the heat in the burning fuel can go directly into steam without first heating cold water.

Then, after gradually increasing the rate of combustion, so that it can "catch up" with the load, the rate of feed should be increased and in a short time the water level will be back to normal.

Inversely, if there is a sudden decrease in load, the proper solution is to "increase the mass of water" so as to absorb all the surplus heat from a normal fire. Then when the fire is where it belongs the rate of feed is reduced to normal.

Thus it is that in a properly regulated steam boiler the water itself is the "boiler's flywheel."

The Delicate Uniflow Engine

EVERY once in a while the writer hears complains about uniflow steam engines. The complainants claim that these engines are too delicate and that the increase in economy is more than offset by trouble costs.

Probably these criticisms are true. The uniflow engine is comparatively new, and it is a fact that new devices almost invariably give trouble during the early or experimental years. The Corliss engine also gave much trouble during its young years. The releasing valve gear, dash pots and four rotating valves

all caused their quota of trouble for the engineer. Let us hope that the uniflow engine has by this time passed through the principal trouble years, and that those now being sold are about the "last word" in uniflow engines. The theory of the uniflow engine is good. The majority of users are well pleased with its performance.

Excellent Leather

JUST recently I was shown a piece of leather belting made from hide, tanned in Europe. The hair is not removed from the hair side but is allowed to wear off while in use. It is claimed that the old method of hair removal by lime-dipping is harmful to the leather, reducing its strength.

The hide for this belting comes from native steers of the Swiss Alps. These steers are noted, it is claimed, for an unusually thick and tough hide. We thus see that as the years roll along belts are being made better and better.

In an interesting booklet recently gotten out, one belt manufacturer proposes making a double belt out of two kinds of leather, one side to be wider than the other so as to take the wear from the finger shifters. The other side, having a high coefficient of friction, is to operate in contact with the pulley. In another instance, in the case of reversing drives and shock drives he proposes a leather that allows a little slip—just the right amount. From the writer's viewpoint both of these ideas are based on good logic.

How About That Damper Regulator?

IN paper mill power plants, heating plants, and elsewhere, now is the time to begin thinking of economizing on coal by regulating the damper automatically. More coal is burned in the winter, usually, than in the summer. Coal can be saved very nicely by means of a modern scientifically designed damper regulator. The hydraulically controlled regulator, or one controlled by a positive external means, usually gives the most satisfactory service.

Faking the Backbone

I LEARNED recently of a method employed by an unscrupulous manufacturer of leather belting whose name I do not know. The practice of this manufacturer is to give the belt the appearance of having been cut from the backbone by a burning process. Side portions are thus made to look like central portions. This is a good thing to know and bear in mind the next time belts are purchased.

Lengths Too Long

OCCASIONALLY, cemented pieces of leather longer than 4 ft. 6 in. are found in so-called first class leather belts. However, lengths greater than this should be looked upon with suspicion because in the average belt 4 ft. 6 in. is the maximum length of the choicest leather. The maker of belts who boasts about long laps is therefore convicting himself and admitting that his belting is of an inferior quality.

Friction Clutches

WHERE a plant is not operating at full capacity all the time, friction clutches are a convenience and an economy factor. Clutches may be so arranged as to cut off a whole department or portion of a department. Several of them may be placed on a single lineshaft, if thought desirable. In that way, almost any part of the power may be thrown off or on instantly. It does no harm to place them on the main shaft, even. To operate an empty machine is almost as costly as operating the same machine in actual use, hence the power saving that accompanies the use of friction clutches.

In the old days, we threw out machines by throwing off the belt. But we preferred to leave the belt on, because of the difficulty and danger of throwing a belt on a rapidly-running pulley. So we threw the belt off only when the machine or machines were to be idle several days or weeks. With the advent of friction clutches and their attendant safety and handiness, these difficulties were removed. If one will test out a machine running "empty" and then "full" it will be understood why so many plants are installing a liberal scattering of friction clutches.

Action of Furnace Gases

SOMETIMES "stratification" is blamed for improper combustion in a furnace. It is said by some writers that a method should be provided for more thoroughly mixing air with gases—that Nature's method is not efficient enough, or that a larger combustion chamber should be provided.

This is all true enough, but these writers go too far in their zeal to mix gases. They stand so straight that they lean backwards. The want to make the mixing of gases a complicated matter and in their writings compare it to the mixing of white and black paint.

I do not deny that thorough mixing is necessary, but mixing black and white paint is hardly comparable to combustion. I cannot see that there is even a close similarity. Mixing paint is a physical operation while combustion is a chemical process. Mix such a chemical as sulphuric acid with water and one doesn't have to do any stirring—the acid itself does it own stirring. Similarly in combustion, the continual change of temperature in the burning gas due to the heat of combustion does the stirring.

People, like paper, are each created of the same base. A pulp, good for strawboard, however, is not suited to a DeLuxe edition.

If you prefer to be accepted in the world's market as linen and bond, do not make a blotter out of yourself. Quick tempered paper rustles loudly, breaks easily—ditto folks.—R. L. S.

Methods of Modern Management

How to Figure Percentage

By G. W. HAFNER

Manager, G. W. Hafner, Inc., Auditors and Industrial Engineers, Chicago

TRADITION says figures don't lie. Yet, the wrong interpretation of figures may throw the head of the business completely off the track. Mercantile agencies report that a large number of commercial failures are directly due to the proprietor's or manager's belief that the business is making a profit; when, as a matter of fact, it is running at a loss. And the reason for this is that, in at least the majority of cases, the business man has been deceived by the use of percentages in allowing for profits.

What Is Percentage?

In using percentages as a tool to work with, we should have a clear understanding of what percentage is. Percentage is a standard of comparison for amounts, just as a thermometer is a standard of comparison for temperature, or an inch, foot or yard is a standard of comparison for lengths. The word "percentum" means 100 parts or 100ths. Therefore amounts are compared by per cent or hundredths, as lengths are compared by inches and feet and temperature by degrees.

Accordingly one amount compares with another amount as each contains a less or a greater number of 100ths, in the same manner that one temperature compares with another temperature according as it contains a greater or less number of degrees, or that one length compares with another length as it contains a greater or less number of inches. It is seen from this that percentage is simply a means for measuring figures.

How to Find Percentages

In finding percentages we always have a clearer view of the matter if we put the figures in the shape of a fraction. Percentage, from the viewpoint of mathematics, is fundamentally nothing else but decimal fractions. You say that 50 is one-half of 100. That means that 50 is fifty one-hundredths or 50 per cent of 100. Likewise 20 is twenty one-hundredths or 20 per cent of 100; and ten is 10 per cent; and 5 is 5 per cent. The principle here is the same as that governing the change of common fractions into decimals, which is: "Divide the numerator by the denominator," or "divide the upper figure of a fraction by the lower."

To illustrate let us assume that the annual sales of a certain business amount to $100,000.00 and that the annual expenses aggregate $25,000.00. What we want to determine, first, is what percentage of $100,000.00 is $25,000.00. To do this we put the figures in the shape of a fraction, and divide the upper figure by the lower, thus:

```
        25000
100000/25000.00/.25
      20000.00
        500000
        500000
```

We find, then, that the total yearly expenses of $25,000.00 represents 25 per cent of the total yearly sales of $100,000.00. And we know from this that, in making up our selling prices, we must add 25 per cent for expenses, plus whatever margin of profit we desire to make.

Why Anticipated Profits Are Not Realized

This is all apparently simple enough. And yet it does not always work out just right, it seems. Let us see, then, what is it that tangles up so many of us in attempting to handle percentage.

For purposes of illustration, let us take, first, the method of the business man who knows nothing about what his expenses are. He has perhaps heard some other man in the same trade or industry say that he figures to make 10 per cent profit, and because that is what he thinks others are asking, he will figure something like this on a sale, which costs him say $20.00.

Cost of goods	$20.00
Add 10% of $20.00 for profit	2.00
Total	$22.00

He will probably mark the goods to sell for $25.00 thinking that the extra $3.00 will cover his overhead expense, and that he will make his 10% profit and perhaps a little over.

Let us see, now, what has really happened:

Cost of goods	$20.00
Expense 25% (not of $20.00 but of $25.00 which will be explained later)	6.25
Total cost	$26.25
Sale price	25.00
Net loss	$ 1.25 or 5 per cent of the selling price.

Next let us illustrate the method of the business man who knows, from last year's figures, that his expenses amount to 25 per cent of his sales, but does not know how to apply that knowledge correctly.

Probably his estimate will show up like this:

Cost of goods	$20.00
Expenses 25% of $20.00	5.00
Profit 10% of $20.00	2.00
Total	$27.00

Let us see what has happened in his case:

Cost of goods	$20.00
Expenses 25% of $27.00 (instead of $20.00)	6.75
Total	$26.75
Sale price	27.00
Net profit	$ 0.25

which is .926 per cent (less than one percent) of the sale and not ten per cent.

The differences between actual and anticipated profit, developed in the above illustrations, are due entirely to the fact that two different bases have been used in arriving at the results. In the first instance the percentage of expense of 25 per cent was arrived at by using the sales at selling prices. In the second instance this percentage was applied to the sales at cost prices. This is the error too often made by business men.

Suppose the cost of a given article or commodity is $1.00, and a merchant wishes to add a margin of 33⅓ per cent to the selling price, how would he figure it? Adding 33⅓ per cent to the cost will not give the desired result, because:

33⅓% of $1.00 equals 33⅓ cents.

$1.00 plus 33⅓ cents equals $1.33⅓, or the selling price.

33⅓ cents divided by $1.33⅓ equals 25%.

Hence, instead of earning 33⅓ per cent on the selling price, as he had planned, the business man would actually earn 25 per cent only, because different bases were used in the calculation.

The following table gives the equivalent percentage to be applied to cost prices in order to secure a given margin of profit on selling prices.

Desired Per Cent on Selling Prices	Corresponding Per Cent on Cost Prices	Desired Per Cent on Selling Prices	Corresponding Per Cent on Cost Prices
25	.333	38	.613
26	.351	39	.639
27	.370	40	.666
28	.390	41	.695
29	.410	42	.724
30	.430	43	.754
31	.450	44	.786
32	.471	45	.818
33	.493	46	.852
34	.515	47	.887
35	.538	48	.923
36	.563	49	.961
37	.587	50	1.00

Rule for Figuring Percentages

In this matter of figuring percentages, the very first thing we must get a firm hold on is this:

The Sale Price Represents 100 Per Cent

To figure by per cent intelligently we must have somewhere something that represents 100 per cent, which in this case is the **SALE PRICE.** When we attempt to figure any part of the whole as 100 per cent, we immediately get into difficulty. All component parts are measured as 100ths of this 100 per cent.

Hence,

If expenses represent	25%;
And profit represents	10%;
We have accounted for	35%;
And the cost of the goods must, therefore, represent	65%;
Making the sale price	100%

In other words, the $20.00 cost of goods is 65 per cent of the sale price, which sale price is represented by the total of 100 per cent.

In figuring percentages of this kind, the following rule must always be observed:

Divide the Amount of the Cost by the Percentage It Represents.

The Answer Will Be the Sale Price.

$20.00 divided by 65% equals $30.77 which should be the selling price of the merchandise, provided the price paid for the goods is $20.00, expenses are 25% of the sales, and the dealer wishes to make a profit of 10 per cent net.

How do we know this is correct? A method to be of any value must be susceptible to mathematical proof. Let us therefore prove the proposition thus:

Cost of goods	65%	of 30.77 equals	$20.00
Expenses	25%	of 30.77 equals	7.69
Profit	10%	of 30.77 equals	3.08
Total	100%		$30.77

This method is absolutely correct, whether it is applied to a 50c sale or to a $500.00 sale.

The selling price is 100 per cent, or the whole. All component parts are represented by 100ths, or percentages of the whole. There is nothing in the entire equation that represents 100 per cent except the selling price. Hence, all percentage computations should be based on the selling price.

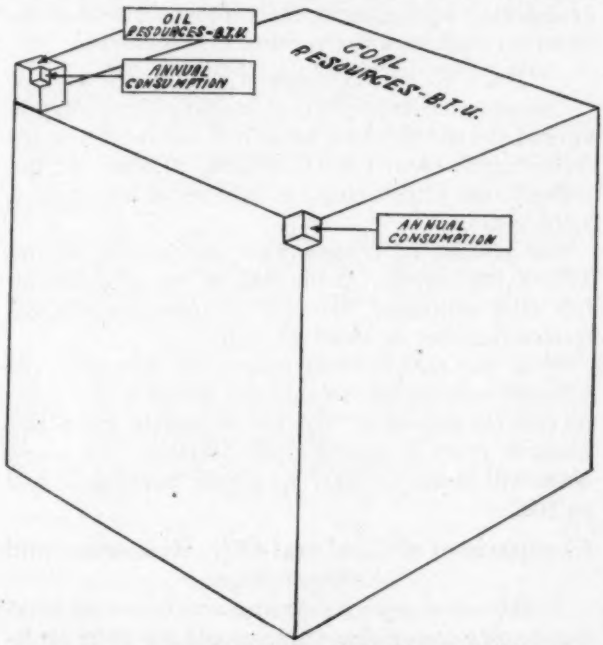
If the day looks kinder gloomy,
An' the chances kinder slim,
If the situation's puzzlin'
An' the prospect awful grim;
An' perplexities keep pressin'
Till all hope is nearly gone—
Just bristle up and grit yer teeth,
An' keep on Keepin' on.

The Power System

Coal Vs. Oil as Fuel

By JOHN F. FERGUSON
Ferguson Engineers, Chicago

ONE QUESTION that very frequently comes up for discussion or settlement is "Shall we burn oil or coal as a fuel." In this article we will consider that the fuel oil or coal is to be consumed in generating steam for all uses in the paper mill, for we could not conceive of a paper mill using oil in internal combustion engines to furnish power for the mill and using oil in the furnace of a boiler to generate



steam for process heating and drying, yet this system is fully equal to many of the systems we find in our newest paper mills.

In order to arrive at some comparison as to operation costs with either class of fuel, let us assume some standards to work from and then we can arrive at a comparison of any condition by substituting these figures and making corrections for particular cases.

Heat Value of Fuel

First, let us assume a heat value for each fuel. Coal as found burned at our paper mill plants varies from 12000 to 13600 B. T. U. in heat value, with perhaps an average of 12800 B. T. U. per pound. Oil as used for fuel will be found to have a heat value of from 18500 to 19000 B. T. U.—let us assume an average value of 18750 B. T. U. Let us assume we have an up-to-date class of steam boiler plant, we should be expecting a continuous over-all boiler plant efficiency with the coal burning plant of at least 75% including all losses in handling, storage, etc., with an equally up-to-date plant burning oil we would expect an over-all boiler plant efficiency of at least 80%. These efficiencies and fuel values would permit of absorbing from one pound of coal 75% of 12800=9600 B. T. U. and from one pound of oil 80% of 18750=15000 to $\frac{15000}{9600}$=1,563, pounds of coal. One ton of coal would be equivalent to $\frac{2000}{1,563}$=1,280 pound oil, or 4,063 barrels at 315 pounds per barrel.

Cost of Operation

Let us figure the comparative cost of operation of two complete plants, one using coal as a fuel and the other using oil as a fuel, using the same grade of fuel and efficiencies as assumed in an early part of this article.

We will consider a moderate sized mill making 65 tons per day of paper (machine finished book of some grade and weight for instance). The steam demand in a mill of this capacity, for process, drying and power system complete will vary considerably with different designs and classes of power systems and type of equipment, but in a high class plant should not exceed 42000 pounds of steam per hour. For instance we have a moderate steam pressure of 250 pounds with 155 degrees superheat and a feed water temperature of 160 degrees, this would represent an equivalent evaporation rate of 1115 B. T. U. $\frac{1115 \text{ B. T. U.}}{970 \text{ B. T. U.}}$=1.2 from 212 degrees water to 212 degrees steam. With this equivalent evaporation rate of 1.2 the steam demand would be equivalent to 50400 pounds of steam from 212 degrees water to 212 degrees steam for all uses in manufacturing and power, or 1461 boiler H. P. This load could be very economically handled by two 550 H. P. boilers or even two 500 H. P. boilers if properly installed.

Let us assume that we install a plant of three 550 H. P. boilers, leaving one boiler or 50% reserved capacity, for reliability in case of emergencies. 50400 pounds steam per hour at 75% boiler efficiency would represent $\frac{50400 \text{ lb.} \times 970 \text{ B. T. U.}}{12800 \text{ B. T. U.} \times 75\%}$=5090 pounds coal per hour=61.08 tons per day, or with oil furnace would represent 61.08 x 4.06=248 barrels or approximately 10,000 gallons per day.

Total cost of coal burning boiler plant consisting of three 550 water tube high pressure boilers, stok-

ers, superheaters, economizers, forced and induced draft fans, overhead coal burners, storage pocket, complete coal handling system from track to bunkers, or storage and from storage to bunkers, stack, piping, building, etc., complete for operation would be around $185,000.00.

Total cost of oil burning boiler plant of above class and capacity including oil burners, oil storage and oil handling system complete for operation would be around $165,000.00.

Operating Labor Cost

Coal Burning Plant—			
3 Firemen, per 24 hours	@	$5.20	= $15.60
3 Firemen helpers	@	$4.00	= $12.00
3 Coal and ash men	@	$4.00	= $12.00
2 Extra firemen and maintenance	@	$5.20	= $10.40
Total for 24 hours			$50.00
Total for 310 days per year			$15,500.00
Oil Burning Plant—			
3 Firemen, per 24 hours	@	$5.20	= $15.60
3 Firemen helpers	@	$4.00	= $12.00
1 Oil man	@	$4.00	= $ 4.00
2 Extra firemen and maintenance	@	$5.20	= $10.40
Total for 24 hours			$42.00
Total for 310 days per year			$13,200.00

Let us assume a maintenance and supply cost of 2% of the investment in each case.

Annual Cost of Operation, Burning Coal at $6.00 per Ton

Fixed Charges on Investment—			
Interest at 7% depreciation 3%, taxes and insurance 2%, $185,000.00	@	12%	= $ 22,200.00
Maintenance and supplies	@	2%	= $ 3,700.00
Labor			$ 15,500.00
Coal, 61.08 tons, for 310 days	@	$6.00	= $113,609.00
Total			$155,009.00

Annual Cost of Operation Burning Oil at $1.55 per Barrel

Fixed Charges on Investment—	
$165,000.00 @ 12%	$ 19,800.00
Maintenance and supplies @ 2%	$ 3,300.00
Labor	$ 13,000.00
Oil fuel, 248 barrels for 310 days @ $1.55 per barrel	$119,164.00
Total	$155,264.00

In this case the extra firemen and maintenance men relieve the firemen one day a week. It will be noted that with a plant of this class the steam demand could be increased up to 50% without any additional help in either case, and while it may be true that the fireman and helper could take care of the oil burning furnaces with some less work than is required to take care of the coal burning furnaces, there is not sufficient safety to permit of any reduction in staff for the oil burning furnaces.

From the above it will be seen that with the use of fuels of the grade as considered and with efficiencies and taking operating conditions into consideration that coal at $6.00 per ton delivered is equivalent to fuel oil at $1.55 per barrel delivered. By revising the fuel costs of operation it will be found that coal at $8.00 per ton delivered will be equivalent to fuel oil at $2.04 per barrel delivered, or with coal at $5.00 per ton delivered will be equivalent to fuel oil at $1.30 per barrel.

While the over-all boiler efficiencies and the production capacity for steam used is no doubt higher than the average they are in line with what can be expected with the higher class and up to date developments. At any rate the mill capacity does not affect the computations in this article in any way, as same is based on total steam demand.

It will be seen that under normal conditions coal is cheaper than oil as a fuel. Yet while there are several items that must also be considered in the comparison of the two classes of fuel, those items in favor of one or the other will vary, depending upon location, fuel market conditions and class of industry, etc. However, when all items and cost of operation are carefully weighed there is generally a margin in favor of the coal fuel.

There have been many articles written on this subject, some showing actual tests and results accomplished in comparing coal as a fuel with oil as a fuel, and the different opinions vary to such an extent that it is impossible to draw any satisfactory conclusion from same, except as the writer is prejudiced against the use of one or the other fuel, or is favoring one of the fuels without any real proof or reason of so doing, and in making this comparison uses figures that are unfair to the fuel which he has determined shall have the worst of his argument.

Fuel Resources and Consumption

The annual consumption of coal of this country is around 650,000,000 tons, while our coal resources are estimated at around 2,500,000,000,000 tons. At the present rate of consumption this would last around 3,850 years.

Our present oil consumption per year is around 375,000,000 barrels. At the present rate of consumption it is estimated that our oil resources will become exhausted in about 25 years.

If all our coal burning equipment were replaced with oil burning equipment, and we all were to use oil entirely instead of coal, our oil supply would last about 3 years in meeting the demand. The above alone will decide whether we should burn oil or coal as fuel.

Comparison of Coal and Oil. Resources and Consumption

To those considering changing over from coal burning, to oil burning, the above should aid them in deciding the proposition.

As a rule the supply and demand of an article governs to a great extent the cost of that article, so we can rest assured that with the increasing demand and fast dwindling resources that the trend of oil prices will continue upward so that in a very few years the price for oil as a fuel for stationary plants will be prohibitive except in exceptional cases. Oil as a fuel on ships and other classes of transports will be found much more favorable than as a fuel in stationary plants, on account of the space occupied and the increased heat value per unit of weight or unit of space occupied.

There is no doubt that there are many cases at present in which the merits of oil burning far outweigh those of coal burning if we consider only the present or very near future conditions. But the far-sighted engineer or manager must look further than the immediate results, and when he considers that the future means a continual rising cost of oil, and possibly lower coal costs he will likely decide in favor of coal.

Difference Between Appraisal and Inventory

Knowledge of Real Plant Values Essential for Cost Basis

By W. W.

INVENTORY is ordinarily a continuous listing of items—named but not adequately described. You do not realize the necessity for proper descriptions, sufficient to identify each item, unless you have gone through a fire and have experienced the searching questions of a fire insurance adjuster. On the other hand, an appraisal completely and thoroughly describes every item of the permanent plant and not only that, but classifies, arranges, or indexes the items in such a manner that they are readily accessible. It is easy to find the listing of any item in an appraisal.

Appraisers come under two classes, namely: architectural and mechanical. The first named measure and describe the buildings, make their drawings and field notes and write up a complete bill of materials, piecebills of all labor and material which has entered into each building or other portions of the plant. They divide the descriptions at the time into insurable values and exclusion values, the latter being the portions below the ground which would not burn and therefore may be omitted from insurance coverage.

Mechanical appraisers list and describe every item of equipment in correct, standardized style, properly classified and arranged. Their listing of machinery, for instance, must check with the floor plans laid out by the architect, whereon every machine is numbered and located. The small items, too, are not neglected but receive just as particular attention as the large values. In fact, in the appraisal nothing of the permanent plant is omitted.

The Method of Pricing

It is often thought that pricing is done by the appraisers on the job. Practically all the pricing is done in the appraiser's main office. The description taken by the appraisers must be perfect to such an extent that the items may be figured from authentic data by specialized experts who do nothing but pricing. Appraisers in an appraisal office are very seldom found in error because they have available the very latest catalogs, price lists, and data procurable. On machinery the price is usually f.o.b. the shipping point, in addition to which the freight, cartage and installation is figured, to put the machine on the floor in running order. Pulleys and belting are listed and appraised in connection with each machine.

The appraiser on the job places the depreciation in a preliminary percentage in his examination of the actual deterioration, wear and tear, condition and type being the main factors considered. The office checks this percentage in accordance with a method in use, whereby it is ascertained that the judgment of the appraiser is fair and reasonable. Age has but little to do with depreciation. It is merely incidental, as the owners may offset age by care and attention, maintenance and repairs. On the other hand, a comparatively new machine may be out of date because of some improved type, and age may not show enough depreciation in such a case. Usually, however, the age method cuts the valuation too low.

Summarizing the Appraisal

The matter collated is then typewritten and summarized—bringing the appraisal into a boiled-down presentation, the certified recapitulation, the blue prints to scale, the cover and the supplement showing net depreciation and insurable values. These are all a portion of this many-sided work not understood or realized by the man who has never had an appraisal made of his plant.

Many times plant owners in the same line are called on to make an "appraisal" of a neighboring plant. When asked how they did it, these appraisers usually say, "Well, we didn't have much time, but we walked around and looked over what was there, made a few suggestions, cut down a few of the values and raised a few others, and then signed a statement." This kind of work bears no relation to a regular appraisal made by a certified company.

An Aid to Insurance Adjustment

Some people do not carry insurance because they imagine that their plant cannot burn. But, nevertheless, uninsured property is a dangerous proposition for the owners. Banks will not loan money on uninsured property, unless otherwise secured. The careful management insures its property.

Many people do not fully understand the co-insurance clause on their policies. It is often called the "80 per cent clause" without knowing the extent of its meaning or significance. Suppose your inventory, based on original cost, less a certain percentage each year, may figure up in round numbers to $100,000, and you therefore place $80,000 insurance under an 80 per cent clause. Suppose you have a $60,000 fire and you think you are fully covered on your loss.

Then the adjusters arrive and it is ascertained that a true valuation would have been $150,000. On this basis you should have placed $120,000 insurance with your 80 per cent clause. On your $60,000 loss, therefore, they would pay $40,000 or two-thirds of the loss, all else being equal.

This sounds bad, but there is no fault whatever with the co-insurance clause or reflection on the insurance companies. The fault is your own in not knowing the actual valuation of your plant.

Revising the Appraisal

An appraisal should be a part of the records in the office of every manufacturing plant, and every five years at least should be rechecked by an appraisal company. If the property is about the same in accordance with old descriptions, it merely means refiguring on replacement values, going over the depreciation again. This revision of an appraisal is a small job compared with a new appraisal, as it is not necessary to remeasure the buildings or redescribe the same machines.

The question of appraisals enters into the figuring of government taxation reports, and for this reason is of extra importance.

The investment in a property is not the dollars it originally cost less the depreciation each year, but the investment is what the property is worth today. Suppose you purchased a plant for $75,000 about five years ago; it depreciated at a certain rate per annum and at the end of five years it stood on the books at $50,000. Suppose you made $10,000 profits during the last year, which you figure as a 20 per cent return, and which you consider a satisfactory figure. But suppose you had an appraisal made and found the property to be worth $100,000 on a fair physical valuation. Under those circumstances the profit of $10,000 would be only a ten per cent return, which would not look quite as good as the 20 per cent first figured.

Personally prepared inventories are often crude affairs, but even were they as good as an appraisal, they would never carry the weight or inspire the confidence as does the disinterested certified report of professional appraisers.

The knowledge of real plant values gives a basis upon which to properly figure cost, whereas undervaluation is deceptive in that it leads to false ideas as to profits.

Lubrication of Paper Mills

By T. C. PORTEUS
Lubricating Engineer, Swan & Finch

WITH apologies to all those who know the art of paper-making from A to Z, and the masters in the mechanical world who know how to lubricate paper machinery and obtain maximum tonnage, it is my belief that lubrication in many paper mills does not receive the serious consideration and attention the problem deserves.

Poor lubrication means increased horsepower consumption, excessive wear and tear and general mechanical inefficiency, with low production at high costs for tonnage produced. Good lubrication means a minimum of horsepower consumption and repairs, general mechanical efficiency, with maximum production and therefore low manufacturing costs. Good lubrication is therefore most essential to successful operation.

Grease Versus Oil as a Lubricant

This is a very broad subject and can only be touched upon lightly here. However, a great many very intelligent mechanical men and high-grade engineers, confidently believe lubricating oil to be the most efficient lubricant for papermaking machinery, and that by using oil exclusively the minimum horsepower consumption will result. This belief is based chiefly on the fact that oil, being liquid, free and perfect lubrication is always assured without any friction, whereas with the use of mineral or animal greases, which as you understand them are usually solids, the lubrication is slow and heat must be developed in the bearings before the grease is liquefied and lubrication is assured.

This is a serious error, for it is unnecessary to liquefy pure lubricating greases to insure good free lubrication; but one of the chief reasons why pure greases are recommended for lubrication of all paper-mill machines and shafting bearings is, due to the very fact they are solids and semi-solids, when properly applied create a thick film of lubricant between the bearing surfaces, much heavier than is possible with lubricating oil; thereby preventing, or at least minimizing the possibility of friction between shaft and bearings.

It is, however, also contended by many high-grade men that on account of the fact that greases are solids, and admitting the use of pure grease creates a heavier film of lubricant between the bearing surfaces, for this very reason grease lubricants are undesirable from a horsepower standpoint. This idea is, however, fast losing favor with mechanical men because of the numerous tests conducted by many paper and other mill engineering departments that prove beyond doubt that by the use of the most delicate instruments on electrically-driven machines, that the horsepower consumption is actually less in some cases and is never increased if the proper grease

is used and applied to the bearings in an intelligent and modern way.

A large manufacturer of ball bearings in the Middle West was in serious difficulty because their bearings are extensively advertised as positively drip-proof; and yet, as you will readily understand, one of their chief marketing points is low horsepower consumption.

The bearings were not equipped with reservoirs or any receptacle whatever into which might fall any liquid that might possibly work out the ends of the housing, and although a semi-solid grease was being used, numerous complaints of dripping from their new installations resulted. At this point a certain lubricating engineer was called in to try to remedy the evil, and found a low-priced, ordinary cup grease in use (a semi-solid) which, when used on high-speed bearings broke down; that is, the body or consistency of the grease was broken, and in many cases separation and dripping resulted. The engineer immediately recommended the use of a better quality grease of stiffer density, but the ball-bearing manufacturers objected to the heavier-bodied lubricant, stating his main selling point is a guarantee of positively the lowest horsepower consumption required of any bearing manufactured.

Test of Greases

A test was therefore suggested and decided upon. Five 1½ inch ball bearings were placed on the testing block and a 1-hp. motor with the necessary instruments were attached. In each case the bearings were thoroughly oiled and after running 2 min. the reading was taken of the power necessary to drive these bearings at about 450 r.p.m., after which grease of various consistencies was applied by the use of a gun without changing the position of the bearings or making any change in the load whatever; furthermore, new bearings were used on each test, the shaft being wiped clean and all bearings before load was applied must spin on shaft easily by a quick turn of the hand.

	Inch Bearings	Power Consumption with oil Watts	No.	Power Consumption with grease Watts
5	1½	27	2	28
5	1½	25	3	25
5	1½	24	Between 3½ to 4	25
4	2½	47	3	47
4	2½	45	3½ to 4	45

Now, no doubt, you would expect the minute these bearings were loaded with grease, the motion of the balls in the race and on the shaft would be retarded, but after 2 min. running under identical conditions the speed, practically no increase was made in horsepower consumption. This opened the eyes of the superintendent, engineers and electricians, for they fully expected that even the softest grease would require several watts more power than oil, but you will notice the heaviest-bodied grease used did not require the slightest additional power to that required when using lubricating oil, and remember, the instruments used in taking the readings were exceedingly delicate—a hand placed lightly on one of the bearings would increase the power consumption 1 or 2 watts.

Tests were later conducted on all sizes of bearings up to 12 ins., with the same result, and in consequence this manufacturer of drip-proof ball bearings is using a stiffer grease than was ever considered possible, and although every bearing manufactured in their plant for the past year and a half has been packed with this lubricant, not a single complaint has been received of dripping bearings or excessive horsepower consumption, and remember, these two points from the basis for their sales arguments, and in fact practically all ball bearings, I understand, are sold on a horsepower demonstration.

Please understand, however, this must not be construed as an argument in favor of the use of stiffer or higher melting-point greases, but the facts in connection with this test are submitted here merely to show that bearings lubricated properly by grease do not require more horsepower than when the same bearings are lubricated with oil.

Lubrication of Dryer Bearings

Dryer-bearing lubrication is one of the most important lubricating problems of the paper mill, and quite some difference of opinion exists as to the correct lubricant for best general results. There are, however, both oil and grease systems for lubricating dryer bearings which are unquestionably good providing some degree of intelligence is used in the care and attention given. A good grade of lubricating oil is used in some mills syphoned by cotton strands to a felt which rests on the shaft, with very satisfactory results, but the great difficulty lies in the fact that oilers and sometimes the superintendent will boast that by this method one cup of oil will lubricate a bearing for three months, which simply means the cotton twine used to syphon the oil to the felt feeds it only that fast, and therefore that is all the oil the bearing gets regardless of the actual requirements for first class results. Again, the intense heat in these journals and bearings will in a short time cause carbonization, the felt becoming quite hard and the surface which comes in contact with the journal is glazed, the result being dry or poor lubrication, which means increased horsepower and wear and tear on machines.

The method of lubricating dryer bearings with a pure animal and mineral grease in a large open box, with which you are all familiar, is one of the best known systems and is the most popular today in the industry, but on account of the intense heat attention at regular intervals must be given the machines to obtain high efficiency.

The main point, however, to be considered in selecting a grease for lubricating dryers is good free lubrication. Too many mechanical men, as well as lubricating salesmen, believe the best grease for dryers is the one that lasts longest. This is certainly a mistake, for the chief object in oiling or greasing bearings is to lubricate, and impure greases containing fillers which increase their melting point and which are never actually consumed should be avoided. Select a grease that will lubricate to the last ounce. Avoid greases which after having been used for a few weeks must be trimmed up because the filler contained has caused the grease to glaze on the surface. Use grease which when placed in your dryer boxes, will lubricate to the last ounce, leaving no residue whatever to throw away.

True, you will use a little more grease, but you will also get good free lubrication at the minimum of horsepower consumption. The cost of using a small additional quantity of grease for lubrication is much more than offset by the decreased horsepower consumption. Just remember the actual cost in the average mill of 1 hp. is probably $50 per year, and you will readily appreciate your entire lubricating expense may be cancelled by saving a few horsepower.

A good yarn grease, that is, yarn thoroughly saturated with a pure grease while in liquid form, should be used sparingly to avoid dripping. We recommend, however, that instead of packing the boxes full of grease and yarn grease that only one side of each box be packed, always on the side toward which the shaft is turning using a layer of yarn at the bottom and a small quantity of grease placed on top of the yarn and along the surface of the shaft. By packing boxes in this manner the journals are always visible, and as only a small quantity of grease is used in the boxes, by exercising a little judgment excess dripping is easily avoided and first-class results follow.

The yarn will naturally carbonize in time and should be changed periodically, but the old difficulty of the whole journal eventually becoming covered by charred yarn, preventing grease from reaching the bearing, is entirely eliminated by leaving the major part of journals exposed—that is, packing only one side of the boxes, using minimum amount of grease and yarn, and making the application at more frequent intervals. This practice will insure free and perfect lubrication at a very low cost and will require very little attention.

Lubrication of Beaters

Proper lubrication of beaters and washers is also important. Pure grease of somewhat lower melting point is recommended, used in conjunction with pure wool-yarn grease.

In packing beater boxes, plenty of yarn should be used in order to create a solid packing which will not be disturbed as the rolls jump. Springs attached to beater grease boxes and rolls are effective in keeping packing in place. This difficulty is also satisfactorily overcome by the use of burlap of fairly open quality. Place several pounds of grease in a piece of burlap and form an oblong sack the full length of the bearings; sew the sack and place it on the shaft; then regardless of how much the roll jumps, no lubricant is wasted.

Lubricating line shafting with pure shafting and yarn grease is, if not the most efficient, one of the most efficient methods in use today. The system consists of removing the upper half of the old-style oil-bearing or cap and replacing with a light cast-iron grease box in which is provided as large an opening for the packing of grease and yarn as is consistent with the strain on the bearing. This does not refer to slotted caps, but large open boxes, such as are used on dryers, except that caps are of course babbitted as required. Many main-line bearings, counter and dryer drives are equipped with a system such as described and are most satisfactory. Bearings which formerely required oiling every hour run 2 to 4 months and some a longer period without attention.

Remember, on this style of bearing a very high melting-point grease is undesirable, for there is no foreign heat to be contended with, and therefore there is no carbonizing of the yarn, and one packing is sufficient to lubricate for a long period, for positively none of the lubricant is wasted—dripping bearings are entirely eliminated.

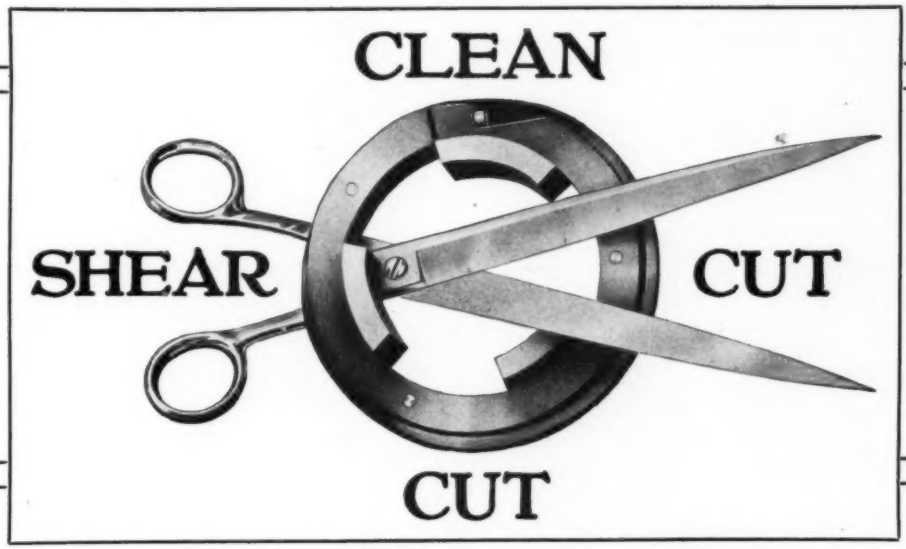
Some of your New England paper mills have bearings equipped on this order and all who have tried the system recommend it. There are some very large manufacturers who have thrown out modern ring-oiling bearings and adoped this system on account of its drip-proof and generally efficient qualities. Horsepower tests on electric drives have proved power consumption is not increased by the use of pure shafting grease and yarn in these open caps.

Jordan bearings are lubricated in a most satisfactory manner by the use of these babbitted grease boxes and pure shafting grease and yarn grease in the bearings.

Rotary cookers are handled in the same manner as dryers.

For press rolls, wire or Fourdrinier rolls, and in fact, all wet-end bearings, a pure waterproof grease of medium density is recommended and approved by all users. A grease that will not saponify in water but will "stay put" and lubricate, fills the bill most satisfactorily. Care, however, should be exercised in selecting a grease for Fourdrinier or wire rolls that will follow the roll bearing and not tunnel, that is, form a bridge over the rolls and therefore fail to lubricate, causing the rolls to stick.

For steam-engine cylinder lubrication, a good quality of cylinder oil or cylinder grease is recommended.



Around This Idea Has Been Built Up a Complete Line of

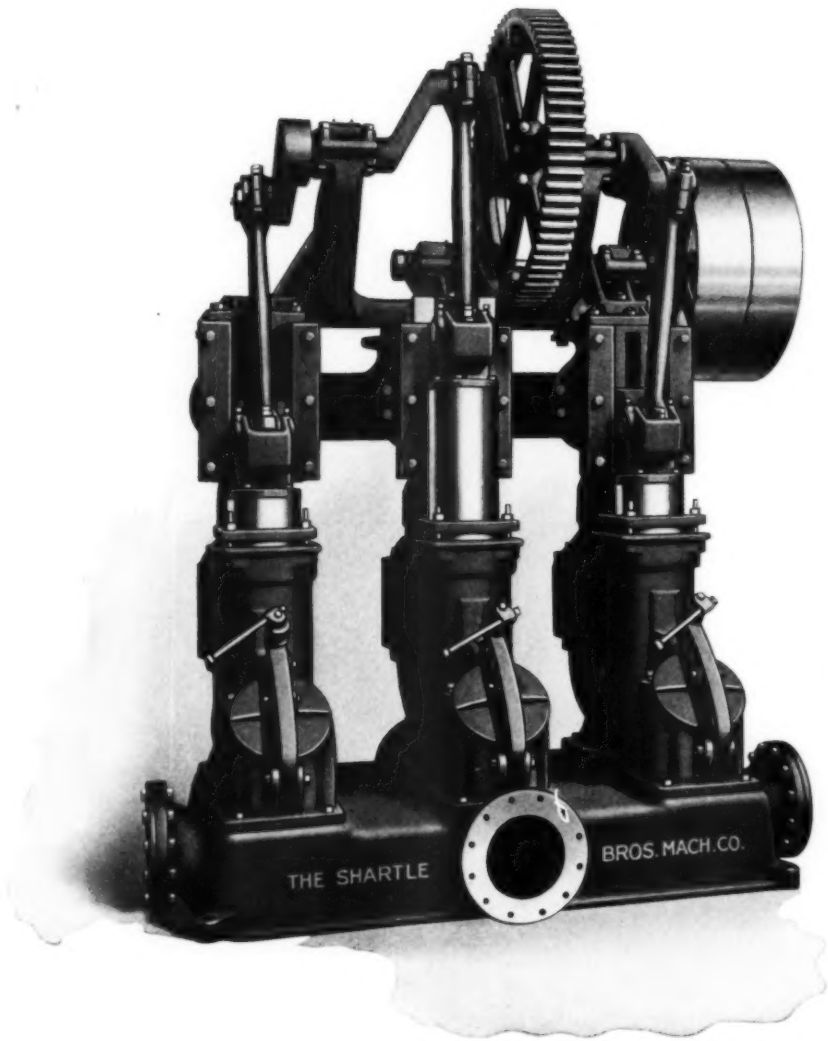
Slitters and Rewinders

BY

SAMUEL M. LANGSTON COMPANY

CAMDEN, NEW JERSEY

We build them 30″ wide for narrow rolls
and
We build them 150″ wide or wider for paper mills
and
We build them and balance them so they will run 2,000 ft. and over
and
Will wind up any diameters up to 60″.



The Largest Stuff Pumps in the World

Are built by The Shartle Brothers Machine Company.

The reputation of Shartle Pumps is founded on 20 years of unfailing service.

Made 7″ x 16″—8″ x 18″—10″ x 20″—12″ x 20″. Each size being made Simplex, Duplex and Triplex, also 18″ x 18″ and 24″ x 18″ Simplex.

The Shartle Bros. Machine Co.

MIDDLETOWN, OHIO

Fall Meeting of Technical Association

THE first session of the T. A. P. P. I., which opened Monday morning, October 10th, at the Hotel Wolverine in Detroit, easily divided itself into two dominant parts. First, the general advancement in research and statistics being made by the several divisions through their committees, and secondly the advancement being made in vocational education as it relates to the pulp and paper industry. The general business session of the fall section was called to order by the president, George Williamson, shortly before ten o'clock, Monday. In prefacing the brief summary of facts with which he outlined the purpose of the fall session, Mr. Williamson emphasized the outstanding factor as being strictly educational. He asked the co-operation of the meeting as a whole in order that all might profit from the research and experience of individual organizations. The response throughout the entire two days to this appeal showed the interest taken in the advancement of the industry by the members of the association.

Following the cleaning up of the general business, individual committees reported progress, after each of which, reports, general comment and discussion was invited. The chief discussion and comment, however, seemed to revolve around the report of the Committee on Vocational Education, which was augmented by the personal experience of various mills who were already installing, or who had installed, various courses in pulp and paper, for their employees, and around the report of the Committee on Waste. The latter committee had been given the entire afternoon, however, and a reprint of the report is given elsewhere.

Report of Committee on Vocational Education

The Committee on Vocational Education, under direction of its chairman, R. S. Hatch, and the secretary, R. S. Kellogg, consolidated a mass of suggestions and concrete facts into a concise resume of conditions as related to the industry.

As a means of stimulating interest and of pointing out ways and means, the committee have gotten out a booklet indicating various methods by which vocational education could be initiated in pulp and paper mills, and offering the services of the committee in starting the preliminary work. In addition to the countless letters received from pulp and paper mills, it developed in the course of the discussion, letters had been received from lines entirely foreign; particularly lines as widely diversified as the Shoe Retailers' Association, Corset Manufacturers, the American Institute of Meat Packers, and the Standard Oil Company.

The correspondence course, developed from the five volumes on the Manufacture of Pulp and Paper, is already in use in some mills, and men are in the field for the Institute of Industrial and Domestic Arts signing up mill men in other plants. Arrangements are being made by the Institute whereby the men may give a draft on the mill for the initial charge and this may be later deducted from the men's salaries in small amounts by the mill.

Similar arrangements have been made, as is mentioned elsewhere in THE PAPER INDUSTRY, by the Nekoosa Edwards Company, with the extension division of the University of Wisconsin. A plan somewhat similar to that adopted by the Nekoosa Edwards Company has been used by the Dennison Manufacturing Company (paper users) for a period of five years. In both cases the original cost of the course is met by the company; later, this is deducted in small amounts from the employees' pay envelopes, and upon proper certification as to satisfactory completion of the course, the entire cost is refunded to the employees. In this way the company figures its interest as financial; the employee's interest is the time expended in study. They are both putting something into the course, and both will benefit correspondingly. Mr. Hatch emphasized the necessity of not making the courses seem cheap to the mill men. That no one ever appreciated what he gets for nothing is a well-known sociological fact.

The extension division of the Massachusetts State Board of Education has prepared a course in Foremen Training in connection with the Federal Board of Vocational Education which is in use in the Hammermill and Champion Fibre Company's plants. In addition, considerable interest was expressed in the revival of the apprentice system in the industry under government and state aid. This is now being tried out in Wisconsin in other lines and also being adapted to the pulp and paper industry. The Wisconsin Industrial Commission will supply literature on this particular phase, upon request. Plant libraries are being installed in mills for the use of employees, and a very satisfactory report of the sale of the five volume work on pulp and paper reported by the chairman.

In view of the vast amount of work entailed in covering the field of vocational education and the financial difficulties encountered by the committee, particularly by the secretary, it was unanimously voted that an expression of confidence in an appreciation of the work of the committee on vocational education be tendered the committee.

Other Committees Report

The Service to Members' Committee, through Mr. Willett Collins in the absence of Frederick C. Clark, the chairman, reported special research and experiment in which all mills participating would be furnished with full detailed reports of results and a general report of results made at the April meeting. The jurisdiction of drying paper is to be given to a special committee in order that both divisions may have opportunity to conduct complete investigations.

The Heat, Light and Power Committee met in July at the call of its chairman, Howard S. Taylor, when plans were made for subjects to be presented at the April meeting.

The Membership Committee, Chairman J. O. Ross, reported an increase of twenty-nine in membership, many of this number being old members who had withdrawn several years ago and were now coming back to the association without solicitation.

The Committee on Soda Pulp reported several experiments under way in an effort to determine the value of the continuous filter system for washing soda pulp. The committee was not prepared to present any conclusions as to the results of the experiments but would be in position to discuss the question thoroughly at the April meeting.

A sectional meeting in mechanical pulp is being planned for the spring conference, and mechanical pulp men are requested to be prepared to discuss the effect of the re-use of white water in the grinder room and its effect on pulp and wet paper machines and the effect of different kinds of burrs on product and quality of mechanical pulp in use in dressing stones.

F. A. Curtiss of Washington, D. C., reported briefly for his committee which had a special section on Tuesday. He also urged that all members make a point of filling out and returning to the committee the questionnaires sent them, in order that the work of the committee might be facilitated without unnecessary correspondence and work.

The Committee on Coated and Processed Papers, under Chairman Sutermeister, reported its progress for the sectional meeting in April when the manufacture of color matters for coated paper, the quality of raw stock required for good grades, and the developments in coated paper will be discussed.

The Committee on Bibliography, under C. J. West, has completed the compilation of a complete reference library of all paper and pulp magazines from all parts of the world. This library is available to members for reference, the only requirement being the payment of postage both ways on magazines sent out for consultation.

Just before the close of the first morning's session, Mr. J. N. Stephenson spoke briefly on the work of the Institute of Industrial and Domestic Arts, of which he is head, in placing the correspondence course prepared from the Manufacture of Pulp and Paper in the hands of mill men. The last pledge of the American Association of $7,500 for completion of the work has not been fulfilled, although the last volume is nearly ready for the press, and he urged that further effort be made to obtain financial support for the measure on this side of the line.

The Committee on Paper Machine Felts—Chairman George Harvey—reported that they were waiting the conclusion of some tests now being made and which would be reported upon fully at the April meeting. The committee received special mention because through its efforts the text in the Manufacture of Pulp and Paper had been checked by several felt manufacturers and corrected in accordance with their suggestions.

New Committee Discussed

The formation of a new committee on Fourdrinier wires was discussed, at the request of several manufacturers. A tentative committee consisting of G. A. MacNaughton, E. C. Spear of the Cheney-Bigelow Wire Works, J. O. Mason of the B. D. Rising Paper Company, George D. Bearce of the News Print Service Bureau and D. C. Everest of the Marathon Paper Mills was named, and an outline of the work of the committee made. This touched upon the different factors affecting the life of wires, and the desirability of standardizing

meshes, which at present are classified according to an assumed mesh and vary as much as two meshes to the inch from standard. As fast as the present reeds are worn out, it is the intention of wire manufacturers to replace them with standard sizes. In an effort to determine factors affecting the life of wires, mills will be classified according to their products and a careful examination of manufacturing problems made. If a sufficient number of mills agree, the wire manufacturers will put a service man on the road to investigate the size of wires going into the finished product, the effect of clay and other fillers on wires, the effect of cleaning methods, materials used for cleaning, degree of abrasions produced by wire brushes, quality of water (which it is thought has a marked effect on failure of wire), the cracking of wires, and influences affecting, whether breaks come at the seam or one half inch from seam, whether the cause is in the manufacture, or whether it lies in method of putting on machine or the operation of machine, and so on. The methods of winding and of storing wire will also be investigated, and it is the belief of the committee that a good mechanical man, not connected with the industry, might be best fitted to arrive at some conclusion regarding these various phases of wire troubles.

A Committee on Cellulose, formed since the last meeting, is under chairmanship of W. E. Byron Baker.

Ross Campbell, chairman of the Dye Stuffs Committee, reported the preparation of a table of properties to go with the chapter on dye stuffs in the text books. Since it appeared that it would be impossible to secure the co-operation of all the members in preparing the table, the only solution of the lack of enthusiasm on the part of some mills was in having the table prepared by a paper laboratory.

R. G. Wolf, chairman of the Committee on Waste, reported briefly, since a section was to be given over to a discussion of his report in the afternoon.

The Committee on Sulphate had been finding difficulties in their path due to the fact that none of the mills represented were actively engaged in manufacturing sulphate pulp, and it had been suggested by the committee that their number be replaced or augmented by members from the south where the majority of sulphate mills are located.

W. A. Monroe, chairman of the Committee on Mechanical Pulp was not present, but reported through Secretary MacNaughton that the committee was preparing a complete report for the April meeting.

Committee on Waste

The entire session on Monday afternoon was given over to a discussion of the report of the Committee on Waste. Much individual experimentation and experience of the various individual mills was also related by their representatives in endeavoring to solve the great problem of waste. Different methods were advanced by various men who had tried them out, and were debated vigorously by all present.

The question of whether bone dry measurement for pulpwood should be replaced by air dried, as would seem logical, came up for discussion also, and was finally referred to the committee to be taken up at the April meeting.

Banquet

Following the interesting session in the afternoon a banquet was held at seven o'clock, in the French room of the Hotel Wolverine, at which Judge Arthur J. Tuttle of the Federal Courts and Professor A. H. White were the speakers.

In his talk, Judge Tuttle emphasized the prime necessity of a man "thinking out loud." He recited his experiences in the past few days in connection with injunctions growing out of various labor troubles, and said, that in his opinion, the time had come for men to realize that a government, based on any other principle than that, where men earned what they could and kept what they were able to accumulate for their children, would fail, and for them to state their belief in their various communities. Owing to the fact that state and county officials are more in contact with the individual opinion of their communities, they are more susceptible to community influence, which is re-acting in increasing the burdens of the Federal courts and decreasing the power of the State judiciary. That this is not only wrong but actually harmful is Judge Tuttle's opinion, and he urged, that by standing for the highest interests of the county and the state, that each individual uphold the power of the community by recognizing the fact that the State judiciary can be as strong as the Federal when founded on public sentiment.

Professor White took up the relation of universities and colleges to industry. His belief that a Professor of Practice, to be maintained in colleges by leading industries, would impart a "flavor" to the knowledge imparted there, certainly would seem to be based on logical premises. He compared the teacher to the manufacturer, with the student as the raw material, and continued with the statement that it would be a poor manufacturer who did not take an interest in the finished product. It has long been a complaint that technical training occupied itself so with details that it fits a man for a little place, but not for the big places. He believes that if intensified training narrows vision, this could be obviated by including sociology and kindred subjects in technical courses. Schools are trying to bring back vacations as times when students work at something aside from their school work. Men who are training themselves for technical positions by working in mills obtain the working man's point of view, and associate themselves with the industry in which they hope to place themselves. It is for this purpose that Professor White advocated a Professor of Practice who would be a man versed in the practical elements relating to the particular industry by which he is employed, and who would at the completion of a certain number of years of college work take the man who wishes to ally himself with that industry and impart the practical parts which will properly round out his technical knowledge.

Tuesday Sections Keenly Followed

The two sections held Tuesday morning on the Drying and Testing of Paper were largely attended and keenly followed. In the Paper Drying Section much discussion was occasioned by the presentation of the two codes for drying paper presented by S. B. Jones, of the Pjebscot Paper Company, and George Bearce, of the News Print Service Bureau. Mr. Jones' code was a highly analytical one and Mr. Bearce described his as being one which would quickly enable the mill superintendent to discover whether his machine was satisfactory or not, and if not, Mr. Jones' code would enable him to analyze it in detail and discover the difficulties.

In the paper Testing Section reports were made and discussed on the following topics:

Microscopic analysis of fibers in paper (given elsewhere in this issue); Folding endurance of paper; Testing, tolerances and sampling; Questionnaire on apparatus and testing of papers; Sizing quality determination.

Following these two sections the conference resolved itself into various groups which took advantage of the various invitations extended the members to visit various plants in or near Detroit. The Detroit Sulphite and Paper Company, the Pt. Huron Sulphite and Paper Company, the Ford Company and the Department of Chemical Engineering at Ann Arbor, Michigan, were hosts to various groups of men. The rather unusual method followed at the fall conference, whereby no formal papers were read, but committee reports heard and discussed in open session, brought far more valuable information in some respects than could be gained in any other manner. This came particularly from the individual mills' experiences in endeavoring to check and correct various conditions predominating in the industry, and the final analysis of the whole matter is that it is the personal element that predominates in every single instance. Waste, the biggest single factor to be overcome and eliminated, resolves itself into a question of the proper supervision of the machine room men, and so it is with all the other phases. And the T. A. P. P. I. is doing a big thing for the industry when it gets down to concrete facts in the manner it did at the fall section.

List of Those Present

The following is a practically complete list of those attending the October meeting:

J. A. Bowers, Erie, Pa.; N. M. Brisbois, Kalamazoo; W. W. Cronkhite, Schenectady; H. B. Carruth, Chillicothe; Ross Campbell, Holyoke; J. P. Cooney, Ypsilanti; E. T. Coughlin, Kalamazoo; F. A. Curtis, Washington, D. C.; K. W. Dunn, Detroit; J. F. Davis, Chicago; R. H. DeMott, New York City; W. F. Dewey, Housatonic, Mass.; G. R. Fillis, Chicago; Harry Fletcher, Alpena, Mich.; O. P. Gephart, Mt. Carrolltown, Ill.; I. Gordon, Vicksburg, Miss.; E. P. Gleason, Pt. Edwards, Wis.; H. W. Guettler, Chicago; E. W. Keefer, Pt. Huron, Mich.; G. H. Harvey, Middletown, Ohio; A. R. Harvey, Middletown; Robert Herron, Chillicothe; C. L. Harter, Kalamazoo; R. A. Heyward, Newton Falls, N. Y.; G. J. Ambruster, Edmonton, N. B.; A. L. Allen, Pittsfield, Mass.; G. D. Bearce, New York City; R. M. Booth, Elizabeth, N. J.; Miss P. C. Barrett, Kalamazoo; W. E. Brown, Brunswick, N. H.; L. C. H. Beighey, Erie; C. A. Booth, Buffalo; Ralph Bosworth, Holyoke; O. L. Berger, New York; H. O. Keay, Grand Mere, P. Q.; Charles Howell, Chester, Pa.; E. C. Tucker, Holyoke; G. E. Williamson, Mittineague, Mass.; E. B. Wardle, Grand Mere, P. Q.; R. F. Kohs, Detroit; W. W. Spratt, E. Pittsburgh, Pa.; W. H. Artz, E. Pittsburgh; A. S. Dowd, Chicago; H. Bell, New York; J. L. Wellman, Chicago; H. N. Lee, Erie, Pa.; A. F. Randall, E. Pittsburgh; F. P. Kline, Detroit; W. G. MacNaughton, New York.

C. L. Higgins, Glens Falls, N. Y.; R. S. Hatch, Garfield, N. J.; R. O. Harper, Housatonic; S. B. Jones, Brunswick; Wm. Bovard, Springfield; W. A. Kelly, Green Bay, Wis.; R. W. Leeper, Dayton; F. D. Libby, Kalamazoo; W. R. Maull, Philadelphia; H. R. Masters, Elgin, Ill.; R. S. Kellogg, New York; F. P. Klund, Erie; C. E. Kinney, Wilmington, Del.; Miss E. McGrath, Elizabeth, N. J.; Miss H. Kiely, Holyoke; F. J. Morrison, Newton Falls, N. Y.; W. L. Mixton, Holyoke; R. H. Morris, Fromington, Mass.; J. J. O'Connor, Chillicothe; H. F. Obermanns, Erie; L. J. Parant, Woodland, Me.; J. D. Rue, Madison; H. S. Rumsey, Chicago; G. H. Spence, Johnsonburg, Pa.; B. S. Summers, Pt. Huron; J. N. Stephenson, Montreal; E. E. Saunders, Millwood, Wash.; T. H. Savery, Chicago; H. Q. Schniewind, New York; E. F. Smith, Cincinnati; J. V. Slade, New York; H. I. Taulor, Dayton; P. Y. Tumy, Grand Rapids, Mich.; E. J. Turner, Kalamazoo; W. F. Theile, Wisconsin Rapids; John Tsagnaii, Chillicothe; C. C. Waldron, Jr., New York; J. L. Woodson, Utica; R. B. Wolf, New York; M. E. Walsh, Pittsburgh; S. D. Wells, Madison, Wis.; J. J. Wall, Milwaukee; D. S. Wegg, Chicago; L. M. Yoeg, St. Hadley's Falls, Mass.; J. H. Slater, Escanaba, Mich.; Paul Zilske, Detroit; A. E. Armstrong, Three Rivers, Mich.; A. J. Baldwin, Newton Falls; S. Ernst Gschwender, Detroit; R. Horton, Detroit; Carl Jenssen, New York City; C. H. Kent, Holyoke; B. T. McBenn, Pt. Edwards; W. H. Millspaugh, Sandusky, Ohio; H. W. Gippert, Detroit; C. A. Brunner, Chicago; H. L. Peckham, Erie; R. W. Pryor, New York.

Report of T. A. P. P. I. Committee on Waste

ROBERT B. WOLF, Chairman

THE investigation of the waste incurred in the pulp and paper industry covers such a broad field that in the opinion of the committee and other members of the T. A. P. P. I. interested, all efforts to obtain original and new data should be confined to about two subjects that give promise of showing effective results in a comparatively short time. Further investigations can be made as the work progresses until the entire field of the pulp and paper industry has been covered.

The two most important problems seem to be the mill effluent or white water losses and the pressing and utilization of bark for fuel.

It is the plan of the committee to make extensive tests on both of these subjects. Mills best equipped to do this work have been selected and their technical departments are assisting in obtaining the data. It has not been necessary in tests already made to interrupt the regular operation of the plant and the work has entailed very little added expense.

Mill Effluent

The question of mill effluent, or white water losses, involves not only the fibre loss, but also the extent of white water utilization. It is proposed to investigate to what extent it is possible to economically utilize white water in mills using different grades of paper and to establish as nearly as possible a "closed system." The actual fibre loss is being determined at a number of plants. The retention of fibres from white water on wire of different mesh will be determined as well as their microscopic study and measurement.

The question of save-all systems and their efficiency of operation enters into the problem, and extensive data upon this subject is being collected and co-ordinated.

The method of study of fibre recovery and white water losses is outlined as follows:

1—**Methods of Re-Use of White Water:**
(a) Machine and beater room; (b) groundwood mill; (c) chemical pulp mills; (d) bleach plant; (e) paper converting plant.

2—**Methods of Recovering Fibre from White Water:**
(a) Strainer type save-alls, e. g., Bird, Improved, Oliver, etc. (b) Filtration with felt or mat, e. g., Fullner. (c) Gravity separation, e. g., settling tanks, Door, Pusey and Jones, etc. (d) Centrifugal separation.

3—**Measurement of White Water Losses:**
(a) Methods of volume measurement of rejected white water. (b) Methods of sampling white water.

4—**Data and Results:**
(a) Actual losses—1. Volume of white water rejected. 2. Total solids in white water in per cent. 3. Ash free fibre in white water in per cent. 4. Total pounds solids lost per ton of product. 5. Pounds ash free fibre lost per ton of product.
(b) Efficiency of save-all systems: to save-alls—1. Volume of white water. 2. Solids in white water in per cent. 3. Ash free fibre in white water in per cent. 4. Solids in white water in pounds. 5. Ash free fibre in white water in pounds. From save-alls—6. Volume of white water. 7. Solids in white water in per cent. 8. Ash free fibre in white water in per cent. 9. Solids in white water in pounds. 10. Ash free fibre in white water in pounds. 11. Solids recovered in pounds. 12. Ash free fibre recovered in pounds.
(c) Cost of operation: (a) Factors affecting cost—overhead, operating and maintenance. (b) Total cost per ton of product recovered.
(d) Quality and value of the recovered stock as a paper making material.
(e) The determination of the point of economy in reclaiming white water losses.

In order to obtain information upon the amount of work being done upon the question of mill effluent and fibre recovery, an inquiry was sent out by the Forest Products Laboratory to approximately 400 mills in the pulp and paper industry. Partial returns from this questionnaire indicate that the white water testing is usually confined to occasional sampling, measurements and observations, rather than regular routine procedure.

Information will be available from 8 or 10 mills that have made, or are conducting, special white water tests. The indications are, from observation and the inquiries, that fibre losses varying from 2% to 12% or more are incurred in the manufacture of various grades of pulp and paper.

The most popular type of save-all appears to be the revolving strainer screens. The inclined screen save-all is finding favor in many mills due to its simplicity of construction, operation and low cost. The gravity settling tank is used by several mills with good results and a new type is being developed, the basis of which is gravity and coagulation by chemicals in combination. The centrifugal separation of fibre from white water is being studied by three equipment manufacturers.

The prevailing method of measuring the volume of white water is by means of the weir. Sampling methods are more varied and the usual method is to take an occasional sample manually. Several mills obtain automatic samples by means of a waterwheel sampler. At least two mills have a revolving arm sampler, driven by a very small motor that dips up a small sample every few minutes. A continuous and automatic device at one mill consists of a small pipe and suction pump that obtains a small portion of the white water going to the sewer.

Bark Pressing and Utilization

Although the bark problem does not appear to be vital in some sections of the country, there is a vast amount of potential fuel value going to waste on account of the difficulty of utilization. It is necessary in some sections to dispose of the bark by running it into the rivers. Other mills are obliged to use more costly methods of disposal.

The waste committee co-operating with the Forest Products Laboratory and the News Print Service Bureau made a survey of the bark utilization problem by means of questionnaires to all mills manufacturing chemical and mechanical pulp.

Replies from about 50 per cent of the mills showed that 28 burned bark and refuse alone, 25 burned coal and bark in combination, 6 otherwise disposed of their bark refuse and 32 did not have bark or refuse. More than 20 of the mills estimated that the moisture in their bark varied from 60 to 85 per cent and many indicated that they considered it of little heating value. The calorific value of the bark was estimated by the different mills from less than nothing to 3,500 B. T. U. per pound as fired.

Extensive tests by the Forest Products Laboratory indicated the following average heating values of bark from dry stored wood:

B. T. U. Per Pound (Bone Dry)

Spruce	9,590
Balsam	8,970
Jack Pine	9,870
Hemlock	9,680
Aspen	8,460

The heating value of river stored spruce was slightly lower, 9,395 B. T. U. per pound, but the general results indicate that there is a large amount of available heat in bark if it can be mechanically reduced to about 50 per cent bone dry. Detailed information on this subject may be found in the preliminary report of the waste committee on "The Utilization of Bark and Refuse as Fuel."

The important feature of bark utilization, where wet barking methods are used, is the mechanical extraction of water. The first step was to obtain authentic figures on the available equipment for pressing bark. The only bark presses on the market known to the committee are the following: The Fibre Making Processes Co., the Giant Nekoosa Press, and the

Paulson Press. The Economy Baler Co. is also developing a press for this purpose. The committee will be glad to learn of other developments of bark presses. The bark pressing data sheet was outlined as follows:

Mill .....Date .....
Duration of Test.....Hours.....

1. Bark Press: type and make:.....
   (Attach blueprint to illustrate the design of the machine.)
2. Drum Barker: make:.....
   (Indicate how water is used and other special conditions.)
3. Kind of wood: species; from land or water storage:.....
   (If from land storage, state length of time in the pile and indicate the condition of the wood. If from water storage, state how long the wood has remained in the water.)
4. Method of feeding bark to the press; continuous or intermittent: .....
5. Percentage of time press actually operated during test:..
6. Water per cent in bark from drums:.....
7. Water per cent in bark from press:.....
8. Total weight of pressed bark during period of test. (Bone dry weight).....
9. Average power required to operate press:.....
10. H. P. hours per ton of bark:.....
11. Number of men required to operate press:.....
12. Man hours per ton of bark:.....
    (Specify how this item is distributed.)

Note.—State condition of press before and after test.
B. T. U. per lb. of bark from presses.
B. T. U. per lb. of dry bark.

Mill Tests on Bark Presses

Actual tests were made on bark presses through the courtesy of the Kimberly-Clark Co., and the Nekoosa Edwards Paper Co. The bark going through the presses came from drum barkers running in water or with showers of water in the drums.

The bark averaged from 70 to 85 per cent moisture entering the presses. The feed was continuous and practically automatic. The two types of roller presses reduced the moisture content to about 60 per cent. These tests appear to check with the normal operation as reported by the mills. The maximum power required is approximately 6 to 7 H. P. per foot width of press roll.

Through the courtesy of Pejepscot Paper Co., and from tests at the Nekoosa Edwards Paper Co. considerable information was obtained on the operation of the reciprocating plunger type of bark press. This press is apparently able to reduce the moisture content of bark from drums to about 50 per cent bone dry. The maximum power required is 25 H. P. and the operation is practically continuous and automatic.

Detailed information upon the bark pressing tests and other related data may be found in the supplementary report of the waste committee on "The Mechanical Extraction of Moisture from Bark."

Bark as Fuel

The fuel value of bark containing the varying percentages of moisture is indicated from the following table of theoretical computations based on:

9,000 B. T. U. per lb. dry bark.
1,220 B. T. U. per lb. required to raise one pound of water from 62° F. to 420° F.

Percentage moisture in bark as fired	B. T. U. per lb. of bark as fired
75	1,335
70	1,845
65	2,365
60	2,970
55	3,380
50	3,890

The utilization of bark as fuel involves a study of the most efficient type of furnace and the best operating methods. The quantity and condition of available bark is also involved. The results obtained from using bark as fuel should be practically the same as those obtainable with hog or wood refuse. A number of evaporative tests on hog fuel are given in the report on "The Utilization of Bark and Wood Refuse as Fuel." These tests indicated that an overall efficiency based on the available heat of 40 to 50 per cent was obtained with hog containing about 50 per cent moisture. Tests on wet hemlock tan bark show efficiencies of 44 to 54 per cent using fuel containing about 65 per cent moisture.

The problem of refuse utilization has received some study in other industries. Authoritative evaporative tests on bagasse containing about 50% moisture show a boiler efficiency of 61% and an equivalent evaporation of 2.63 per pound of fuel as fired when burned in a newly developed type of refuse furnace.

In order to economically utilize bark, the following points are apparently essential:

1. The bark should be reduced to approximately 50% bone dry and fed to the furnace with some degree of regularity.
2. The design of the furnace should provide for sufficient grate surface to give correct combustion and refractory walls to dry out the moisture.
3. Correct draft conditions for most efficient combustion should be determined and maintained.

Cost Keeping Methods That Show Broke Losses

A direct result of the attempt to cut down the waste incurred in supercalendering, rewinding and cutting of book paper at the Newton Falls Paper Company led to the development of cost records applying to these operations that show the cost of shrinkage or brokage in dollars and cents. This development is used in conjunction with the process cost system. It clearly shows the cost per ton of broke losses and agrees with modern accounting principles. The accounting staff of the News Print Service Bureau rendered advice in the arrangement of these particular items on the cost sheets.

The loss due to broke represents the difference between 100% operation and actual running conditions. The stock is returned to the beaters and its scrap value may be disregarded because it immediately goes into the next batch of paper. Any broke of different color or furnish that is stored is practically held in suspension until the next run of that particular grade during the month, and its value, for all practical purposes, is the same as new stock.

Most mills indicate their broke shrinkages in tons and percentages for statistical records. The translation of these losses into dollars is a simple and effective way of bringing the fact before the executives, superintendents, foremen and operators. The broke loss percentages are proportional to the cost per ton due to brokage and the two figures in combination should emphasize the importance of this factor in operation.

Similar adjustments can be made on order cost sheets and in other cost keeping methods so that similar results may be obtained. The proposed method should be of great assistance in determining if the brokage cost on any particular order is consistently costing more than in other grades.

In the following chart and cost sheets showing the development of this method of showing the broke losses, the word brokage was used in preference to shrinkage, because the loss is not a true shrink of material as in white water and screening losses. The fundamental principle is that the total cost of paper is divided (1) by the tonnage delivered to the calendering department and (2) by the tonnage produced by the same department, the difference being the "Loss Due to Supercalendering Brokage" per ton. The same method follows for the rewinding and cutting departments. It may be possible to extend this principle to the paper machines if the actual white water losses are determined and the quantity of furnish is definitely known.

It is customary in book mills to weigh the broke from the calender, rewinders and cutters to compute the percentage of broke loss of each respective department. The tonnage is charged back to the beater room at no cost, during the month, but included in the furnish percent together with the clay and other materials. The customary method of figuring furnish percents is illustrated in the following table:

Furnish	Percentage
Sulphite	25%
Soda	25%
Old Paper	30%
Broke	20%
Clay	20%
Total	120%

The percentage in excess of 100 may be considered as actual furnish shrinkage. The weight of dry machine broke may be obtained for statistical purposes and in some cases it may be possible to compute the combined wet and dry broke from the theoretical production.

The sample cost sheets with assumed figures show the detail and it should be noted that in accordance with prevailing cost keeping methods, conversion cost is based on the actual tons produced.

Manufacturing Cost of Book Paper—Cost of Supercalendering
(Assumed Figures)

	Tons	Total Cost	Cost per Ton
Total Mfg. Cost Unsupered Paper...	600	$51,000.00	$85.00

Loss Due to 5% Supercalender Brokage	30		4.47
Cost of Producing 570 Tons Supercalendered Paper	570	51,000.00	89.47
Manufacturing Labor		1,140.00	2.00
Repair Labor		570.00	1.00
Repair Materials		228.00	.40
Miscellaneous Materials		342.00	.60
Power		1,140.00	2.00
Total Conversion Cost		3,420.00	6.00
Total Mfg. Cost of Supercalendered Paper	570	$54,420.00	$95.47

Add Inventory at Beginning of Period Total.
Deduct Inventory at end of Period.
Manufacturing Cost of Sales.

Cost of Rewinding and Finishing

	Tons	Total Cost	Cost per Ton
Total Mfg. Cost 200 Tons Supercalendered Paper Trans. to Rewinders	220	$21,004.20	$95.47
Loss Due to 6% Rewinder Brokage	13		6.00
Cost of Rewinding and Finishing Supercalendered Rolls	207	21,004.20	101.47
Manufacturing Labor		465.75	2.25
Repair Labor		103.50	.50
Repair Material and Supplies		207.00	1.00
Cores		103.50	.50
Wrapping Material		155.25	.75
Power		103.50	.50
Total Conversion Cost		1,138.50	5.50
Total Mfg. Cost Rewound & Finished Rolls	207	$22,142.70	$106.97

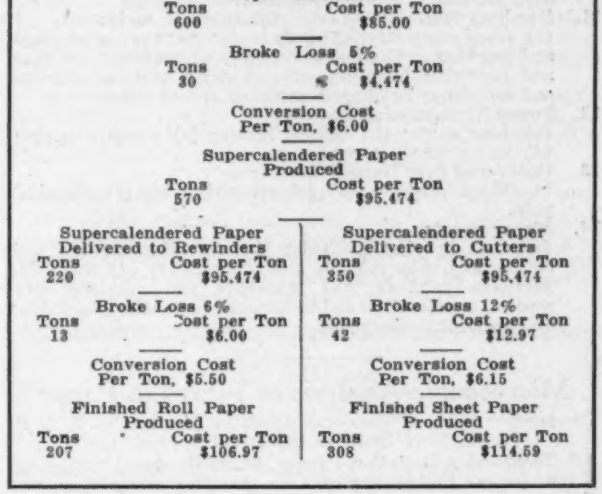
Add Inventory at Beginning of Period Total.
Deduct Inventory at end of Period.
Manufacturing Cost of Sales.

Cost of Cutting and Finishing

	Tons	Total Cost	Cost per Ton
Total Mfg. Cost 300 Tons Supercalendered Paper Trans. to Cutters	350	$33,420.80	$95.47
Loss Due to 12% Cutter Brokage	42		12.97
Cost of Cutting and Finishing Supercalendered Rolls into Sheets	308		108.44
Manufacturing Labor		847.00	2.75
Repair Labor		154.00	.50
Repair Material and Supplies		308.00	1.00
Twine		154.00	.50
Wrapping Material		231.00	.75
Power		200.20	.65
Total Conversion Cost		1,894.20	6.15
Total Mfg. Cost Finished Sheet Paper	308	$35,315.00	$114.59

Add Inventory at Beginning of Period Total.
Deduct Inventory at end of Period.
Manufacturing Cost of Sales.

Cost Chart Indicating Losses Due to Broke



General Investigation

Although no attempt will be made at present to conduct special investigations in reference to the other losses, in the pulp and paper industry, all available data is being collected and co-ordinated for future study. An outline of the general losses incurred is as follows:

1. **Wood Preparation:**
(a) Loss of wood in barking; (b) loss of wood in cleaning; (c) bark disposal and waste; (d) Sawdust; (e) over or undersized chips; (f) moisture test; (g) production from B. D. weight of chips (Weightometer).

2. **Groundwood Mill:**
(a) Slivers; (b) screenings—use of refiners; (c) mill effluent—save-alls and re-use.

(In this connection it is necessary to obtain information on uniform methods and equipment in relation to the waste of materials. It is advisable to obtain information in reference to peripheral speed, sharpening of stones, pressure and other factors effecting the quality of pulp. The question of the operating cost of both pocket and magazine grinders will also enter into this study to some degree although it is difficult to express definite conclusions and give specific figures on this question.)

3. **Sulphite Mill:**
(a) Loss of sulphur—**Acid Plant:** sublimed sulphur; formation of So_4; leaky gas and acid coolers—**Digester Room:** leaky recovery coolers; leaky storage tanks; methods of cooking; recovery apparatus. (b) Loss of lime and limestone—the use of lime of incorrect chemical composition. (c) Loss of fibre—excessive screenings; waste of fibre in screenings; blow pit losses; white water losses; drainer tile. (d) utilization of waste liquor; (e) utilization of turpentine; (f) loss due to excessive steam consumption; (g) loss of heat in blow off.

(The problem of the utilization of superheated steam and the effectiveness of strainers should be considered.)

4. **Sulphate Mill:**
(a) Waste of chemical in recovery process; (b) waste of materials in smelting furnace due to operation; (c) heat loss in recovery process; (d) utilization of lime sludge; (e) utilization of turpentine; (f) loss in washing process—chemical fibre; (g) steam consumption.

5. **Soda Mill:**
(a) Waste of chemicals due to operation; (b) waste of chemicals in recovery plant; (c) utilization of heat losses in rotary burners; (d) loss in washing process—chemical fibre; (e) utilization of lime sludge; (f) steam consumption.

6. **Old Paper Plant:**
(a) Sorting and dusting loss; (b) shrinkage of material loss in washing; (c) chemical loss; (d) steam utilization.

7. **Rag Mill:**
(a) Sorting and dusting loss; (b) shrinkage or material loss; (c) washing and bleaching loss (fibre); (d) drainer loss; (e) steam consumption.

8. **Paper Mill:**
(a) Method of measuring stock; (b) incorrect preparation of furnish; (in connection with this problem the economical utilization of power in the mechanical treatment of the pulp should be considered). (c) drying of paper, machine and building radiation losses; (d) steam consumption; (e) utilization of air.

(In connection with the drying of paper, standard methods of procedure are being outlined, and it will be possible to obtain authentic figures on this question in the near future. This problem involves the drying system, air system, paper machine hoods and a number of other important features.)
(f) Loss production and broke loss (wet and dry); (g) inefficient utilization of machine equipment, wires, and machine clothing; (h) white water losses.

9. **Steam Plant:**
(a) Utilization of condensate; (b) dry chimney gas losses (economizers and preheaters); (c) leaky settings; (d) loss due to scale and soot; (e) inadequate equipment

(stokers, blowers, etc.); (f) radiation from bare pipes; (g)operating methods; (h) loss of combustible in ash.

10. **Bleach Plant:**
(a) Chemical loss (bleaching power vs. liquid chlorine); (b) fibre shrinkage; (c) steam consumption; (d) washing loss; (e) manufacture of electrolytic bleach.
11. **Handling Materials—Cost —Efficiency of equipment.**
(a) Wood conveyors; (b) pulp conveyors; (c) coal storage and handling; (d) sulphur storage and handling; (e) lime and limestone handling; (f) old paper and rag storage and handling; (g) paper handling and storage.
12. **Power Transmission Losses:**
(a) Line shaft; (b) belting losses; (c) pump slippage; (d) water wheel losses.
13. **Decay and Fire Hazard Losses:**
(a) Wood storage; (b) groundwood pulp; (c) chemical pulp.
14. **Management:**
(a) Cost keeping methods; (b) operating records and charts; (c) shop councils and committees; (d) wage adjustment methods; (e) insurance and pensions; (f) medical examination and treatment; (g) safety education; (h) vocational education.

Microscopic Analysis of Fibres in Paper

Co-operative Study of Various Methods by Members of T. A. P. P. I. to Establish Standard Procedure

IN Technical Association Papers, Series V, June, 1922, page 139, appear the results of a co-operative study of thirty-eight samples of specially prepared mixtures of various kinds of fibers. An examination of these results and the discussion which took place at the sectional meeting on paper testing in New York, April 12 and 13, 1922, indicate that additional work is desirable. To facilitate this study the Bureau of Standards has been requested to prepare two sets of samples—one of known composition and one of unknown composition. The samples of known composition are to be used in studying and becoming familiar with the several methods; then the composition of the unknown samples will be determined and the results obtained be used as a guide in establishing a standard method.

In the following a brief description is given of the various methods which are in use.

A—Quick estimation method; B—Gravatt; C—Spence; D—Graff; E—Count. Where the procedure is identical or nearly so, the description of manipulation is not duplicated.

Sampling

Tear several small pieces of paper of equal size from different parts of the sheet or sheets to be tested. The pieces should be taken from as widely distributed points as possible. Tear pieces into small bits.

Quick Method. Take not less than three small pieces.

Gravatt Method. Determine by superficial examination the type of paper. Apply phloroglucinol, if necessary. Take samples from different parts of the sheet to make weights, as follows:

Groundwood—Sulphite mixtures .....0.075 gram
Soda—Sulphite mixtures .....0.050 gram
Rag—Sulphite mixtures .....0.060 gram

Tear samples into small bits.

Cooking and Disintegrating

Heat to boiling in 1% NaOH, (½% NaOH—Graff) pour off caustic, wash several times with water, then once with 1% HCl and finally with water. Roll the paper into a ball and work between the fingers to loosen the fibers. Place the ball in test tube (or flask) with water and shake until the fibers are completely separated. Dilute, if necessary, until suspension is about 0.03% fiber.

Quick Method. Heat to boiling in denatured ethanol. Take pieces out and blot off ethanol with hard filter paper. Bring to boil in water. Do not disintegrate samples.

Gravatt Method. Place ball in eight-inch test tube with exactly 25 cc. water. Disintegrate by shaking.

Spence Method. After disintegrating dilute, if necessary, so that suspension contains about 0.02% fiber.

Graff Method. After disintegrating dilute, if necessary, until fiber suspension is about 1 in 2500 (0.04%). Fill four test tubes four-fifths full of suspension.

Transfer of Fibers to Microscopic Slide

Immerse straight glass tubing, about ¼ inch internal diameter, about 1 inch into dilute fiber mixture. Close upper end of tube with thumb and place contents of tube on a clean slide. Remove water by drying on bath.

In making up the fiber suspension use as little water as possible. When the test tube is shaken clots of fiber will remain on the side of the tube. Remove one of these clots with a needle and place on a slide. Or pour the whole contents of test tube on several thicknesses of filter paper; then remove a bit of the fibers with forceps or needles and place on slide. These methods are suitable if fiber is long.

Quick Method. From each of the pieces of paper remove as small a bit as possible with forceps and place on slide. Separate the fibers out with needles. If too many fibers are present remove part by halving, after thoroughly mixing. Finally separate fibers and apply drop of stain. Again separate fibers and put on cover glass.

Gravatt Method. Cut off a 5 cc. Mohr pipette at one end of the graduations, or use straight glass tube of 6 to 7 mm. internal diameter. Take exactly 2.5 cc. of suspension by sucking or by dipping tube into suspension and closing upper end with finger. Place the 2.5 cc. on clean slide and distribute evenly. Dry on electrical hot-plate with aluminum top ¼" thick. Keep surface level and adjust heat so that water does not boil. When water is about two-thirds evaporated, distribute fiber evenly by means of needles and tapping. When dry the fibers stick. Remove all fibers except a square patch the size of the cover glass near each end. Apply stain.

Standard slides made up in this manner should be prepared and kept on hand unstained. Make several slides of sample being examined.

Spence Method. Use a glass tube 10 inches long with a seven thirty-second inch (5.5 mm.) internal diameter, with one end rounded so as not to have sharp edges and the other fitted with a small rubber bulb. Mix fiber thoroughly, insert end of tube two inches below surface, expel two bubbles of air and draw about half an inch of the mixture into tube. Empty contents of tube, 4 drops, into four separate slides, place slides in air bath to dry, cool and apply stain.

Graff Method. From each of the four test tubes prepare two slides, using a standard dropper with 4 mm. inside diameter. Place one drop of suspension at each end of each slide. Dry in draft of warm (not hot) air. Apply drop of stain and remove surplus by tilting. Put slide on dissecting microscope and place all fibers, from each drop, lengthwise, side by side, in middle of slide. Cover with cover glass. Usually it is necessary to add another drop of stain.

Formula for and Application of Stains

Preparation of Herzberg Stain. (See M. F. Merritt, Paper Trade J., 24 Aug., 1922.)

Solution A. 50 g. dry $ZnCl_2$ in 25 cc. distilled water. Specific gravity at 28° C. should be 1.8. Pour into tall cylinder.

Solution B. With part of 12.5 cc. distilled water rinse thermometer, hydrometer and original $ZnCl_2$ container. Dissolve 5.25 g. KI and 25 g. I in balance of 12.5 cc. water.

Add B to A. Stir well and place in dark. The following day pipette off the clear solution and put into black bottle. Add a leaf of crystal I.

To make smaller amount of solution use the following quantities, using same procedure:

20 g. $ZnCl_2$ in 10 cc. H_2O

2.1 g. KI, .1 g. I } in 5 cc. H_2O

Lofton-Merritt Stain for Sulphate Pulp. A—2 grams Malachite green in 100 cc. distilled water. B—1 gram Basic fuchsine in 100 cc. distilled water.

Keep in tightly stoppered bottles and mix in equal quantities when wanted for use.

After fibers are placed on slide dry with hard filter paper. Add two or three drops of the compound stain and let stand for two minutes, during which time the fibers are being gently mixed with needles. Remove stain with filter papers, add 3 or 4 drops 0.1 per cent HCl, allow to remain on slide 10 to 30 seconds while mixing fibers. Take off HCl with filter paper, add water and remove with filter paper. Add final drop of water and put on cover glass. Proper staining and washing can be determined by tests on samples of pure unbleached sulphite and pure sulphate pulps.

(See Technical Association Papers, Series III, Dec., 1920, pages 1-7.)

Bright Stain for Bleached and Unbleached Pulps. (See Paper Testing Methods, pages 7-10.)

Simple Method to Distinguish Unbleached and Bleached Sulphite. After fibers are placed on slide, dry with hard filter paper. Add one drop or more of 1% Malachite green in water. Let dye remain not less than one minute, meanwhile mixing fibers gently with needles. Draw off dye with hard filter paper, add water, mix fibers and draw off water. Add one drop 0.1% Congo red in water and treat as in fore-

going. Add final drop of water, distribute fibers on slide, put on cover glass and examine with microscope.

Bleached sulphite pulp is colored entirely red.

Unbleached sulphite pulp is colored all green, red and green or red with bordered pits green.

a. Newsprint grade sulphite shows a larger proportion of all green fibers.

b. Easy bleaching grade sulphite shows very few all green fibers but in practically all fibers, some or all of the bordered pits are green.

Sulphate pulp is stained all green. To determine if sulphate is present use the Lofton-Merritt stain.

(Modification of method of Siebert & Minor Paper, 28 Jan., 1920, p. 1007.)

Microscope and Magnification

Any standard microscope fitted with a two-thirds inch (16 mm.) objective and a one inch (x10) eyepiece, giving a magnification of about 100 diameters, may be used. A substage condenser with iris diaphragm, and a mechanical stage increase ease and accuracy of work. For methods involving measurements a stage micrometer and an eyepiece micrometer are necessary.

Spence Method. Use magnification of about 160 diameter.

Graff Method. For placing fibers use any standard dissecting microscope.

Application of Stain. Put one or more drops of stain on fiber. Remove excess stain by tilting the slide.

Methods of Analysis

A—Quick Method. Estimate the proportions of the different kinds of fiber present by looking over the slide. Use at least three slides and take average of results. Compare with standard mixture.

B—Gravatt Method. Estimate from several slides. Compare with standard mixtures stained at same time.

C—Spence Method. Use a microscope giving magnification of about 160 diameters, fitted with a mechanical stage. Taking the diameter of the field as a measure, note the total lengths of the various fibers present in several fields. Apply factors given below and calculate percentages.

Weight factors—

Rag	1.000
Coniferous sulphite	.870
Hardwood soda	.500
Poplar	.450
Birch	.662
Beech	.525
Maple	.365

Other factors must be determined—Groundwood, straw, esparto, etc.

D—Graff Method. Using a mechanical stage and filar micrometer determine the total length of each kind of fiber present on each of the eight slides. Apply fiber weight factor as given by Spence.

E—Count Method. Any count method which does not include measurement of lengths and allowance for variations in weight of the different kinds of fiber cannot be accurate. Since specific methods which involve counting and measuring the fibers are available no general count method will be considered.

Accuracy and Practicability

The quick estimation method is one which allows most rapid work. In mixtures of only two kinds of fiber, it is accurate to about 5 per cent.

Graff claims an accuracy of within 1 per cent for his method.

No degree of accuracy is established for any of the methods.

Discussion

Any errors which may occur in careful preparation of sample are very minor in comparison with errors which occur in the actual determination.

The quick estimation method is of sufficient accuracy for much work that needs to be done. The absence of use of caustic reduces time of washing and the fact that the pieces of paper are used whole saves the time involved in disintegrating by shaking as used in other methods. The time required to separate with needles the very small amount of fiber placed on the slide is short.

It should be easy to establish a standard between the Spence and the Graff method if such a type of manipulation is considered best.

The Gravatt method has the appearance of being built on the most logical foundation for accurate work.

The combination of the Gravatt method of weighing out the original sample, and this or the Spence or Graff method of transferring to slide, with the measuring of fibers and application of factors as in the Spence method should give the best possible results.

Notes. Always use distilled water. When removing fiber suspension always shake thoroughly.

Superintendents Ass'n Plans New Divisions

The American Pulp and Paper Mill Superintendents Association are planning the formation of a new division to be known as the Connecticut Valley Division of the association, which will bring mill superintendents in the Connecticut Valley into closer relationship. The new division will be established at a meeting to be held at Holyoke, Mass., on November 18th, and a number of men prominent in the industry are being solicited to address the meeting.

Another division, it is rumored, to be composed of superintendents of board mills located in Indiana, Illinois, Kansas and Iowa, will be established in Chicago and will be known as the Chicago Board Division.

George Reynolds Will Address Paper Conference

One of the greatest bankers in America, George M. Reynolds, president of the Continental and Commercial Bank of Chicago, will be the feature speaker at the annual fall business conference of the American Paper and Pulp Association at Chicago, on Thursday of Paper Week.

Wanted

First-class Fourdrinier man for night superintendent. Advise full particulars as to experience and give reference in first letter. Address The Paper Industry, Box 41.

First-class back-tenders and winder-men for Fourdrinier running 300 feet. Advise full particulars as to experience, and give references in first letter. Address The Paper Industry, Box 42.

ASBESTOS FELT PAPER MILL FOR SALE

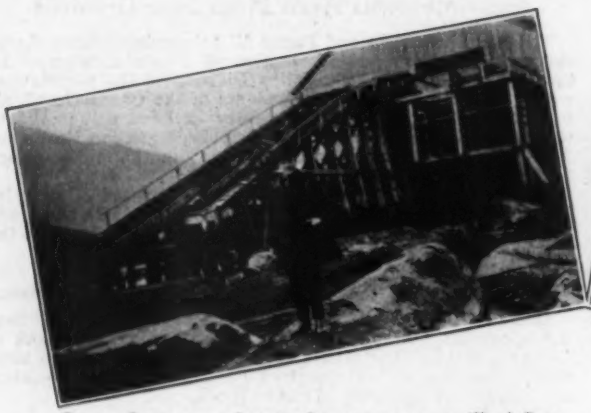
This is one of the longest established paper and asbestos felt mills in the United States. It is located within 10 miles of Boston. The plant is fully equipped for making asbestos products or roofing felts, and can be adapted for making paper specialties, or for other manufacturing purposes. The property includes:

Six acres of land
Complete plant and paper making equipment
Five Warehouses
Settling pond
Perpetual water rights
Can be operated by steam or water power

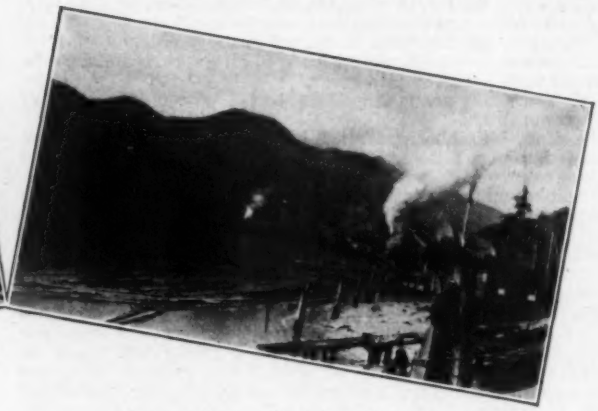
Address

JOHN ROBERTS & SON CO.

WALTHAM, MASS.

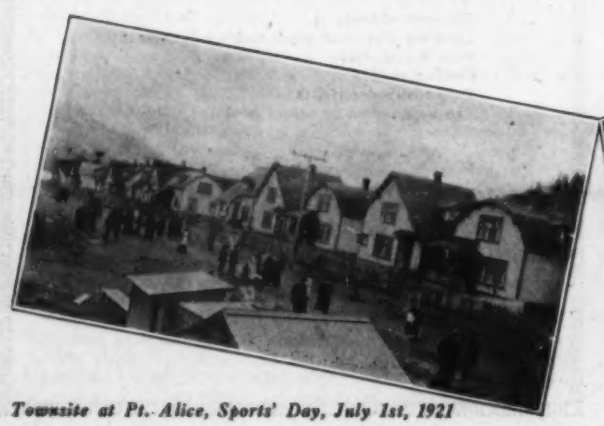


Spruce logs, seven feet in diameter, at sawmill of Port Alice plant



Boom and sawmill of Port Alice plant

Whalen Pulp and Paper Mills, Ltd., Port Alice, British Columbia



Townsite at Pt. Alice, Sports' Day, July 1st, 1921

Lake Victoria, two miles east of Pt. Alice, 450 feet above tidewater

The Port Alice Plant of the Whalen Pulp & Paper Mills, Ltd.

PORT ALICE, the newest plant of the Whalen Pulp and Paper Mills, Limited, is situated on the southeast arm of Quatsino Sound, near the northwestern end of Vancouver Island, British Columbia, 28 miles from the Pacific Ocean.

The location is ideal, being almost entirely surrounded by mountains with an abundant growth of timber suitable for lumber and pulpwood.

The plant is particularly favorably situated for the development of water power, although at the present time steam, obtained for the most part from the burning of mill refuse, is used to generate the electric power required in both the saw mill and the pulp mill.

A group of lakes lies about two miles east of the plant with sufficient run-off to develop 20,000 H. P. Victoria Lake alone, which is at an altitude of 300 feet above the mill site, has an area of 3,700 acres and a run-off of over 400 second feet, is capable of yielding 11,000 H. P. and can be developed right at the mill site by the construction of a tunnel 6,060 feet in length.

The distance to the open ocean being short, Port Alice lends itself admirably as a shipping place. During the past few months the following deep sea vessels have been loaded and discharged there:

S. S. "Robin Goodfellow," loaded, 3,400 tons pulp.
S. S. "Knoxville City," loaded, 2,094 tons pulp.
S. S. "Edgar F. Luckenback," loaded, 2,315 tons pulp.
S. S. "Barrymore," loaded, 1,440 tons pulp.
S. S. "Ocean Prince," loaded, 2,000 tons pulp.
S. S. "Stanley Dollar," loaded, 1,200 tons pulp.
S. S. "Providencia," loaded, 1,000,000 FBM lumber.
S. S. "Minnaires," discharged, 1,000 tons sulphur.
S. S. "Nevadan," discharged, 1,500 tons sulphur.

In addition to ocean vessels, boats in coastwise trade, such as the S. S. "Princess Ena," S. S. "Chilliwack," S. S. "Gunner," etc., make regular calls with coal and bleach powder cargo.

Port Alice is connected with the east coast of Vancouver Island by a ten-mile trail from Coal Harbor on Quatsino Sound to Hardy Bay on the east coast. At present this trail is not sufficiently passable to permit of the transportation of heavy supplies but is very frequently used by employes and others coming to and leaving the plant.

The S. S. "Princess Maquinna" makes Port Alice the terminal port on her tri-monthly passenger and freight trips along the west coast of the Island. On each of these trips general cargo, such as provisions for the population, and supplies for the plant, are received—and on the return journey to Victoria a cargo of pulp is taken.

Government fishing cutters and lighthouse tenders use Port Alice more or less as the base port of their northern operations, and the Thiepval, Armentieries, Mallispeono, and Estevan have made frequent calls.

The mill site and town site occupy approximately 60 acres, all of which have been cleared and stumped.

The town site section comprises over half of the total area; fifty modern houses, comfortably constructed and supplied with the latest conveniences, are at the disposal of the married mill hands, while a hotel and rooming houses serve as lodgings for the unmarried members of the community.

In the northwestern section of the town site are located the oriental quarters.

The saw mill and pulp mill, both described herein in detail, are modern in every respect; the production obtained from the operation of the sawmill averages 3,500,000 FBM per month, and the pulp mill yields an average daily production of 90 tons "Snowhite," a very fine bleached sulphite fibre.

A brief description of the plant may prove of interest.

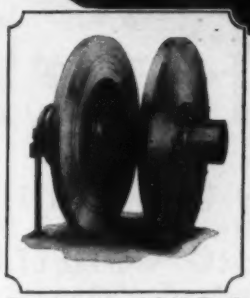
Saw Mill

The main part of the saw mill building is 460 feet long by 60 feet wide. The jack-ladder, or log haul, is 178 feet long, and at the outlet end of the mill is the sizer platform, 71 feet 6 inches in length.

The foundation was thoroughly piled throughout. All timbers used in construction are of liberal dimensions, and a good system of bracing was adopted. There are two floors, the ground floor being 8 feet above high water. A monitor roof runs the full length of the main building and ample window space is provided, affording good lighting. A spacious filing room is provided over the main floor and is fully equipped. The roof trusses span the full length of the building, leaving an unobstructed floor.

The log pond and booming ground afford ample storage and quick facilities for sorting the logs. The mill is a two-sided one, but at present one side only is installed. The log deck

One of two 60-inch C-H Magnetic Clutches on Pulp Grinders. Each Clutch transacts a maximum of 1,500 H.P. at 300 R.P.M.



Exploded view of C-H Clutch

On a tissue paper machine drive a 30-inch C-H Magnetic Clutch was installed on the floor below with control switch above. Depreciation on felts was greatly reduced and as a result all machines of this mill are equipped with these clutches. At the Neenah Paper Mill a 54-inch C-H Clutch is located between the water wheel and generator. It automatically cuts off the generator when the speed exceeds a given maximum.

Simplicity of C-H Magnetic Clutches Liked by Paper Mill Men

The C-H Magnetic Clutch consists of but two parts, one of which carries the magnetic coils. There are no toggles, links, or other members.

Engagement and disengagement are thus easily controlled by simply pushing a button or operating a small switch.

They require but small space and operate successfully at high or low speeds. They do not grab their load, but have smooth accelerating action. The period of energizing is sufficient to cushion the force of engagement.

The motor or other power unit may be brought up to speed before the mill line, pulp grinders or other machines are connected. This permits use of motors with low starting torque such as synchronous and squirrel cage types, the former being particularly advantageous because it raises the power factor of the system and reduces power costs.

If you give us a plan of your drives we will be glad to make recommendations and furnish complete information.

ASK FOR PUB. 3030 ON MAGNETIC CLUTCHES

THE CUTLER-HAMMER MFG. CO.

Magnet and Clutch Department

Works: Milwaukee and New York

Offices and Agents in Principal Cities
Northern Electric Co., Ltd., Can.

C-H **MAGNETIC CLUTCHES**

Rigidity

is the main requisite in the construction of a Cylinder Mould.

On this depends the levelness of the sheet and the lift of the facing wires.

Let us describe our method of building these important parts of your machine.

Beloit Iron Works
BELOIT WISCONSIN

is equipped with a Simonson log-turner, nigger, overhead canter and log loader and kicker.

A Sumner, 3 block, 72-inch carriage, with electrically controlled set works and a two block trailer, is operated by a Sumner twin feed engine. One 66-inch top circular head-saw and one 60 inch bottom saw; two 40 inch trimmers; one 60 inch jump saw; one 8 saw slasher, saws 6 feet centers; a 72 inch by 12 inch edger with automatic spotter and a band resaw form the chief equipment of the mill.

The mill is amply provided with live rolls and transfers for handling both pulpwood and lumber. A sorting table for lumber is situated on the west side of the outlet end of the mill. A Stetson & Ross sizer, capable of sizing up to 16 inches by 20 inches, and two planers are in operation. Two diamond hogs cut up the mill refuse, and a 24 inch belt conveyor, approximately 450 feet in length, conveys the refuse to the fuel bin.

Individual electric motors are used throughout the mill. The top head saw is direct connected to a 150 H.P. Westinghouse induction motor, and the bottom saw to a 250 H.P. Westinghouse induction motor. The edger is driven by a 250 H.P. Westinghouse synchronous motor, direct connected. Two other Westinghouse synchronous motors are used in the saw mill driving transfers, etc.—one 100 H.P. and one 75 H.P. The band resaw is driven by a 60 H.P. Canadian Westinghouse slip ring motor, the slasher by a 50 H.P. Westinghouse induction motor, the log haul by a 50 H.P. Westinghouse induction motor, and the planing mill by one 100 H.P. Westinghouse slip ring motor. The two Diamond hogs are complete, together and driven with two 125 H.P. Westinghouse slip ring motors, one connected each end. Various other smaller motors are used on conveyors, trim saws, etc.

Cordwood Mill

Independent of the saw mill is a cordwood mill, 256 feet long by 60 feet wide, provided for the purpose of barking small logs for pulp. This mill is substantially built on a piled foundation and is completely roofed in.

A hot water tank 150 feet long, 10 feet wide and 4 feet depth is provided for softening the bark on the cordwood blocks. A battery of five Greenbay barkers of an improved type, operated by a 200 H.P. Westinghouse induction motor, forms the chief equipment of this mill. A No. 480 endless chain conveyor runs the entire length of the building carrying the rossed logs to the wood room.

Cleaning Deck

In the same building as the cordwood mill are located the knotter drills and auxiliary equipment for the purpose of drilling knots from pulpwood.

The drills are four in number, each operated by individual 5 H. P. motors. A 5 saw slasher—saws 4 foot centers—between this building and the cleaning deck proper, slashes pulpwood into suitable lengths for easy handling. The cleaning deck proper, 175 feet long and 60 feet wide, is equipped with cut-off saw, hand barkers (Waterous type), live rolls and transfer chains, all electrically driven, where pulpwood passes through the final cleaning process before going to the wood room. This deck also serves as a storage for surplus pulpwood.

Wood Room

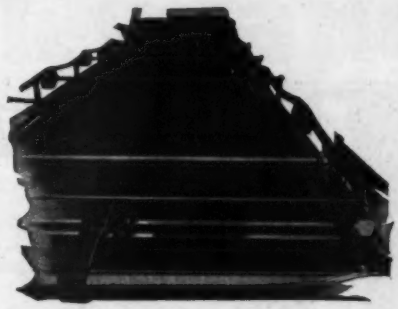
The wood room is situated at the north end of the cleaning deck. The building is 112 feet by 63 feet 6 inches, and is 50 feet from the ground floor to the roof plates. It is of mill construction throughout and is substantially built.

In this building the pulpwood is chipped for the digesters. It contains two 88 inch Carthage chippers and two crushers mounted on concrete foundations; two revolving screens and two Flat Shaker screens, all electrically driven. The chippers and crushers form two separate units, a chipper and crusher to each unit. The chippers are each driven by a 125 H.P. Westinghouse slip ring motor, and the crushers each by 75 H.P. Westinghouse slip ring motor. A 30 H.P. General Electric motor drives the Shaker screens and a 20 H. P. General Electric motor drives the conveyors, and various other small motors are used on elevators, etc.

After being thoroughly screened, the chips are conveyed to the chip storage building. This is a frame building 160 feet long and 32 feet wide, and 40 feet from the foundation to the roof plates. It is partitioned off into bins each 80 feet long, for separating the spruce chips from the hemlock. Its capacity is 180,000 cubic feet of chips. It is equipped with two chain conveyors, one overhead for distributing the chips throughout the building, and the other beneath the floor for conveying the chips from the bin to a bucket conveyor which delivers them to the chip drier.

Chip Drier

This building is of reinforced concrete construction throughout and is 33 feet by 32 feet and 62 feet high. It contains a



Bon Voyage!

IN the long journey of pulp through the paper-making process, most important to the finished paper is the trip across the Fourdrinier wire.

A Fourdrinier wire, smooth as glass, without a ripple or wave in it, is assurance that the pulp will be evenly distributed and travel in a uniform layer.

Many paper mill superintendents, knowing the importance of this part of the journey, specify Tyler Fourdrinier Wires.

To assure a firm, uniform wire, Tyler Fourdrinier Wires are woven on looms especially designed and built by The W. S. Tyler Company. The wire is drawn from special composition rods in the Company's wire-drawing department, and the weavers are trained for years in the art.

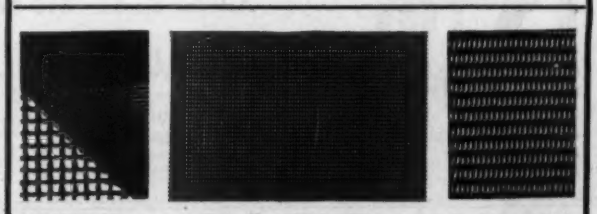
Tyler Fourdrinier Wires can be supplied in any width up to and including 250 inches.

Send for Samples

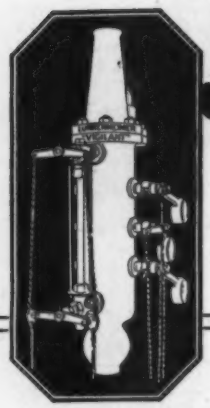
The W. S. TYLER COMPANY

CLEVELAND, OHIO

Manufacturers of Fourdrinier Wires, Cylinder Faces, Washer Wires and Corduroy Cloth



Backing Wire | Tyler Fourdrinier Wires | Corduroy Cloth



Sounds an alarm

— when danger is near.

LUNKENHEIMER

"Vigilant" Safety Water Column

FIG. 1335
Automatic Pattern Ex. Hy. Regrinding Water Gauge

A safety device as essential for the protection of the boiler against extreme high or low water levels as the Pop Safety Valve is against excessive steam pressure.

The Lunkenheimer "Vigilant" Safety Water Column sounds an alarm before the water reaches either danger limit. It thereby aids in protecting the boiler against accident and in safeguarding the boiler attendants against injury or death and the plant from destruction.

Statistics covering boiler accidents will prove the desirability,—yes necessity of equipping boilers with the Lunkenheimer "Vigilant" Safety Water Column.

For working steam pressures up to 250 lbs., with a size to fit every boiler, and a variety of Water Gauges and Gauge Cocks available to meet individual requirements.

Ask for Booklet 519-FG.

FIG. 919
"Vigilant" Safety Water Column

FIG. 1264
Ex. Hy. "Renewo" Gauge Cock

THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
NEW YORK CHICAGO CINCINNATI, U.S.A. BOSTON LONDON
EXPORT DEPT. 129-135 LAFAYETTE ST., NEW YORK

"America's Best since 1862"

20027-17-67

Hess pneumatic chip drier. All the chips are passed through this drier for the purpose of taking out the excess moisture before going to the digesters.

After drying the chips are again passed through a rotary screen and the dust removed. They are then fed into a blower pipe, and a 56" Sturtevant fan blows them to the top of the Digester building. The 24 inch Blow Pipe is 220 feet long and 120 feet high. The chips are received into a cyclone or separator and fall into the concrete bins directly over the Digesters.

A 75 H.P. Canadian Westinghouse induction motor drives the Sturtevant fan, and a 30 H.P. General Electric drives the drier fan, with smaller motors on conveyors and elevators.

Digester Building

This building is of reinforced concrete construction throughout, is 80 feet long, 32 feet wide, and 124 feet high. There are five floors in the building. At present there are three 20 ton digesters, each being 18 feet in diameter and 46 feet high. There are three concrete bins, one over each digester, the capacity of each bin being 19,000 cubic feet. Each digester is supported by four reinforced concrete piers, 18 feet in height.

The digesters were supplied by the Willamette Iron and Steel Works, of Portland, Oregon. A one ton Otis-Fensom elevator runs from the first floor to the fourth floor.

Screen and Bleach Building, Including Blow Pits

The screen and bleach building is of re-inforced concrete construction, with the exception of the roof, which is of wood. The length, including that portion of the beater room already constructed, is 132 feet, the width 81 feet. There are three floors. On the lower floor East, are the three blow pits, each 50 feet by 26 feet by 11 feet 6 inches in height. These are lined throughout with 3 inch fir lining.

At the centre and for the full width of the building are the stock chests. These chests receive the stock from the blow pits. Directly over the stock chests are the stock pumps, used for pumping the stock to the top floor, where it is passed over the flat screens, etc. To the West of the stock chests are the four wash tanks for the bleached pulp. Each is 39 feet by 16 feet by 15 feet high.

On the third or top floor, there are 20 flat screens for the stock and four for the buildings, stock thickeners for the bleached and unbleached stock, 4 knotters and a breaker. There is also one set of rifflers.

On the West portion of the second floor are the stock tanks for the bleached and unbleached stock, the bleach liquor storage tank and the Belmer bleachers, the latter having a bleaching capacity of 90 tons of sulphite stock per 24 hours. At the centre portion and for the full width of the floor, is an elevated motor platform from which the bleach agitators, etc., are driven. At the east end are five, vertical, centrifugal, quiller screens, and one horizontal quiller screen. Two eight inch stock pumps deliver the stock to the flat screens. There is also a white water storage tank on this floor directly over the blow pits. This tank conserves the water taken from the stock thickeners, which is used for washing the freshly cooked stock in the blow pits.

Individual motors furnish the power in this building. Five stock pumps are each direct connected to 20 H.P. General Electric induction motors. The Belmers are each belted to a 30 H.P. General Electric induction motor. The horizontal quiller screen is belt driven by a 20 H.P. General Electric induction motor, and the vertical quiller screens are each direct connected to vertical induction motors (25 H.P. Westinghouse). The stock chest agitators are driven by a 25 H.P. Westinghouse induction motor. The stock thickeners, knotters, etc., are driven by a 60 H.P. General Electric induction motor and the flat screens by two 50 H.P. Westinghouse induction motors.

Between that part of the beater room already constructed and the machine room building are located two bleached stock storage tanks of 50,000 gallons capacity each.

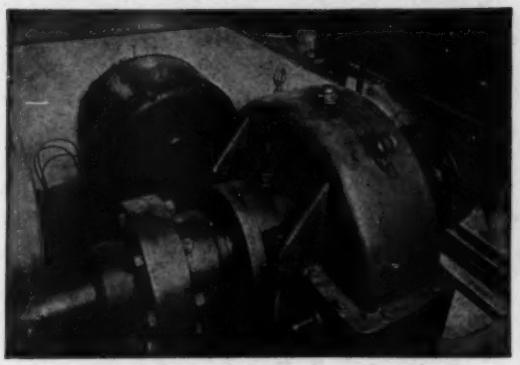
Machine Room

This building is of re-inforced concrete with the exception of the roof trusses, purlins and sheetings. It is 280 feet in length, 84 feet in width and 50 feet high. The basement floor is five feet above high water; the machine floor 15 feet above basement.

In the basement is a Robb-Armstrong 250 H.P. engine, driving the pulp drying machine, a Sturtevant vapor drying fan, stock chests, stock pump, live and exhaust steam lines, water piping, etc. Also motor driven hydraulic pump feeding two 250 ton presses.

The exhaust steam from the engine is used to heat the air in the Sturtevant drying heaters, which heated air serves as an auxiliary drier to the pulp drying machine.

Cleveland
WORM GEAR
REDUCTION UNITS



Cleveland Worm Gear Reduction Unit applied to mill line shaft. Motor 400 H.P. at 1200 R.P.M. Ratio in worm drive 14⅜ to 1.

High Speed Motors *plus* Cleveland Worm Gear Reduction Units

MEAN both initial and permanent economy. Cleveland Worm Gearing of correct design and right tooth pressure gives a more even flow of torque than is secured by any other device and handles abnormal gear ratios with ease.

Of course the design of tooth and worm and proper materials and proper cutting are of utmost importance. Those who know what has been done with properly designed worm gearing under the extraordinarily rigid demands of motor truck service with its sudden application of torque will appreciate in some measure the remarkable advance made in industrial worm gearing.

It will be perfectly clear to you why we are able to prove high efficiency; low cost of upkeep; freedom from vibration; greater compactness; greater silence; positive lubrication and low upkeep cost.

Write us for latest worm gear data and put your speed reduction problem up to us.

The Cleveland Worm & Gear Co.

America's Worm Gear Specialists

CLEVELAND, OHIO

DRAVO-DOYLE COMPANY, Pittsburgh
Cleveland, Indianapolis, Philadelphia
New England Representatives
FRANKLIN MACHINE CO.....Providence, R. I.
Pacific Coast Representatives
ALFRED H. COATES CO.....San Francisco, Cal.
Rocky Mountain States Representatives
THE VULCAN IRON WORKS CO.....Denver, Colo.

Supplying Dry Warm Air At The Roof Line

Machine Room, Milham Division, Bryant Co. Notice warm air distributing ducts.

Bryant Paper Company
Kalamazoo, Michigan

June 3rd - 1921.

Clarage Fan Co.,
City.

Gentlemen:

In talking with our Superintendent, Mr. E. H. Gilman, concerning the installation of the fan system for the absorbtion of moisture in the of our machine rooms, he has stated to me that your equipment has done more than you agreed it would do when we placed the order with you.

Thanking you for the attention that you have given this matter, we remain,

Yours very truly,
BRYANT PAPER COMPANY,
Felix Englestatter
President.

Clarage Fans and Blowers for Paper Mill Service

Aside from apparatus for roof drying, we manufacture fans and blowers for heating and ventilating, moisture absorption, conveying paper stock, mechanical draft and other purposes. Also small vertical steam engines. You will find that Clarage equipment operates with a minimum of attention and the necessity for repairs is the exception, not the rule.

As the paper mill man well knows, excess water vapor in the machine room can cause serious trouble. Not only does moisture promote a rapid decay of the roof, but the vapor, condensing on the roof surface and steel truss work, drips down onto the new paper causing spots and frequent tearing with a consequent loss of production. The Bryant Paper Company solved their problem by installing a Clarage Roof Drying System.

We ask that you read the accompanying letter from the Bryant Company, as evidence that the Clarage Roof Drying System is giving results. They have recently purchased a duplicate system, which further proves they are satisfied. Have Clarage engineers co-operate with you in solving your problem. Write us today

CLARAGE FAN COMPANY

KALAMAZOO, MICHIGAN

SALES OFFICES IN PRINCIPAL CITIES CONSULT TELEPHONE DIRECTORY

Manufacturers of Fans, Blowers, Heaters and Engines

On the South side of the main floor is the Bagley & Sewall, 160 inch sulphite drying machine, and the two 250 ton baling presses. The sulphite drying machine is built so that it can be changed into a Fourdrinier book machine. The press parts, drier and floor drives are built as if they were to run book paper. The wet end consists of a single cylinder mould with the necessary baby rolls, which wet part can be discarded and replaced by a Fourdrinier part. The dryer part is arranged so that a felt and felt roll can be added. The floor drive is of the quill type and suitable for the best arranged book machines. This machine is high class and reflects credit on the workmanship of the builders. The sheet cutter was supplied by the Beloit Iron Works, and is a very fine machine, which is in keeping with the usual product of the Beloit Iron Works. Provision is made for another machine of this size on the North side.

The roof trusses are of the Howe pattern and span the full width of the building. Crane girders are provided along the North and South walls to receive an overhead crane of 80 feet 8 inches centre to centre of tracks. Plenty of window space has been provided affording a well lighted and ventilated building.

The baled pulp is conveyed to the storage warehouse a distance of 150 feet by gravity rollers. The pulp storage warehouse is a frame structure, 162 feet in width, and, at present, 162 feet in length. It is proposed to continue this building until it adjoins the machine building. It is at present capable of storing approximately 5000 tons of sulphite.

A well constructed wharf with a frontage of 411 feet has been built, the main portion being of creosoted piling. Standard gauge crane tracks run the full length, with a spur running to the sulphur storage building and connecting with the yard tracks.

Bleach Mixing and Sulphur Storage Building

This building is of frame construction 94 feet by 80 feet, the sulphur storage portion being 54 feet by 80 feet, and the bleach mixing department, 40 feet by 80 feet. Concrete mixing tanks and settling tanks in which the bleach liquor is prepared, have been constructed within the building.

Acid Plant

The sulphur burner building is of re-inforced concrete throughout. It is 24 feet by 28 feet. Two No. 9 Vesuvius oxidizing sulphur burners are installed, each capable of burning 12 tons of sulphur per 24 hours. A 16 inch fan draws the gasses to the cooler tank. This tank has an area of 850 sq. ft. and contains eight 8 inch lead pipes, approximately 50 feet long.

The acid towers stand on a concrete base 50 feet by 54 feet. At present, there are two sets of three tanks with accommodation for a third set. Each tank is lined with end wood blocks 2½ inches thick. They are six feet in diameter inside the lining and 90 feet in height. The acid towers are close to the wharf and the acid is pumped from there to the storage tanks, situated East of the digester building. The acid storage at present consists of three stave tanks (cylindical), each 20 feet in diameter and 24 feet high, giving a combined storage of 150,000 gallons.

Limestone for the Acid Plant is obtained from the Company's quarries on the shore of the Sound within four miles of the mill site.

Power House

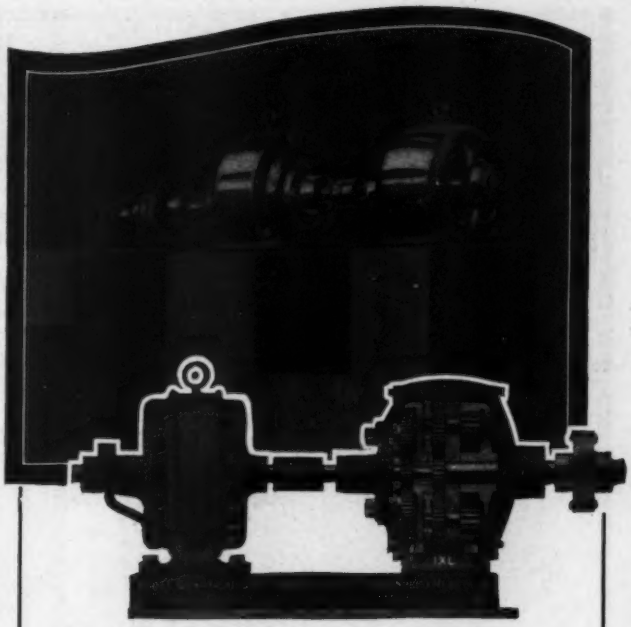
The power house building is of re-inforced concrete construction throughout. The length of the building is 140 feet, the width of the boiler room 52 feet and of the engine room 42 feet, the two being separated by a partition wall. The height of the engine room is 39 feet 9 inches and of the boiler room, 30 feet 6 inches. There are two floors in the engine room. A crane girder carries a 25 ton overhead hand crane of 40 feet span.

A concrete smoke stack, 225 feet high and 9 feet internal diameter at the top, lined with fire brick to a height of 70 feet, stands 18 feet East of the power house building.

The boiler house contains six 250 H.P. and one 500 H.P. Babcox & Wilcox boilers, and one 500 H.P. Goldie-McCullough boiler, all fitted with superheaters. The boilers are designed to burn both mill refuse and coal and are all equipped with Jones automatic stokers.

A fuel bin of frame construction, 40 feet by 160 feet and 48 feet in height stores the sawmill refuse, which is conveyed directly to the boilers as required.

The power equipment in the engine room consists of one Westinghouse-Parsons steam turbine, 2000 k.w., 1250 R.P.M., condensing; one Allis-Chalmers, 1000 k.w., horizontal cross compound 120 R.P.M. Corliss valve engine, condensing, direct connected to a 1000 k.w., 22 volts, 3 phase, 60 cycle alternator; one Robb-Armstrong, 750 k.w., vertical cross compound 120



A Foote Speed Reducer is directly connected to high speed motor and agitator in storage tank. Note the simplicity of installation and that Reducer is entirely protected against dirt, grit, etc.

Why the Foremost Engineers Choose Foote Speed Reducers

Five prime reasons determine engineers in their selection of Foote Speed Reducers.

First, Efficiency of service—Second, Economy of installation—Third, Low maintenance and long, dependable service—Fourth, Safety to workers—Fifth, Mechanical construction of the reducers.

Foote Speed Reducers deliver more motor power than other types of reduction drives. The reducers are direct connected between motor and agitator, conveyor, etc., thereby simplifying the installation with a resultant reduction in construction cost. High speed motors can be used, thereby creating a saving in the cost of motors.

All mechanism in the reducers is entirely enclosed and runs in oil, giving utmost efficiency and freedom from danger of explosion and fire. The design of Foote Speed Reducers is the last word in engineering. Foote Speed Reducers are the ideal drive for storage tanks, mixers, conveyors and other paper mill equipment.

Made in ratios of 5 to 1 up to 500 to 1 for motors of any horsepower.

CONSULT FOOTE ENGINEERS

Let us tell you about some of the many different applications for Foote Speed Reducers. Our Engineering Department is at your service without obligation. WRITE US TODAY.

Foote Bros. Gear & Machine Company

Mfrs. of Rawhide and Bakelite Pinions and Cut Gears of All Kinds. Send for Catalog. Special Machinery Made to Order. Submit Your Blueprints

250-260 N. Curtis St. Chicago, U. S. A.

J. R. Shaya, Jr., 143 Greenwich St., New York City.
Knight & Knight, Underwood Building, San Francisco, Cal.

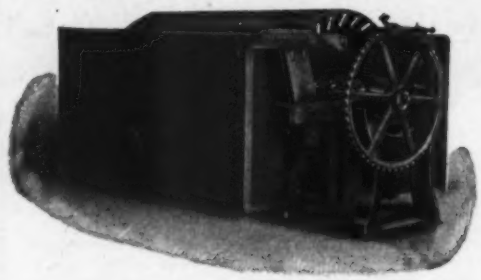
Rogers and Special Wet Machines

SINGLE AND DOUBLE PRESS
FOR CONVERTING CHEMICAL PULP INTO SHEETS 48% DRY

25-30 TONS air-dry pulp per 24 hours. Built in 72" width only, with patented pulp weakening and separating device or our new automatic knife cut-off attachment.

FREIGHT CHARGES are greatly reduced. Savings on this item alone often pay for the machine in one year.

110 Machines Now in Use. 28 Sold the Past Year



The Wood's Machine

Used as Pulp Thickeners, Savealls, Pulp Washers and Water Filters

ADVANTAGES:

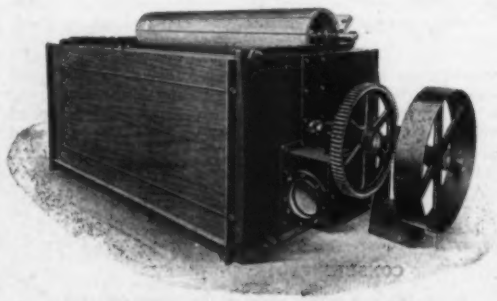
Reduced Wire Costs	No Couch Roll
Enormous Capacity	Minimum Repairs
Only 2 H. P. Required	No Doctor
Works Automatically	Requires No Attention

TWENTY-NINE SOLD DURING THE PAST YEAR

Wells Undulating Knot and Sliver Screen

Will bear closest investigation from every angle. It separates knots and slivers from all kinds of pulp efficiently, continuously, automatically with negligible cost for operation and upkeep. Simple but rigid construction. Only best materials used. Operation in plain view.

60 TONS DAILY CAPACITY, STANDARD SIZE. WRITE FOR BLUEPRINT AND FURTHER INFORMATION



Improved Decker

Single or Double Cylinder Type

Built in the following sizes:

Cylinder mould diameter, 36" or 40".

Face of cylinder mould, 72", 84" or 96".

Cylinder mould of best reinforced construction and properly supported with our latest design outside bearings.

Vat furnished either all wood or with cast-iron ends.

For Stability and Efficiency our Improved Deckers are Unexcelled

PULP AND PAPER MILL MACHINERY

GLENS FALLS MACHINE WORKS

GLENS FALLS, NEW YORK

R.P.M., Corliss Valve Engine, condensing, direct connected to a 750 k.w., 2200 volt, 3 phase, 60 cycle alternator; one 60 k.w., D. C., steam driven exciter set, and one 45 k.w., M. G. exciter set; one Robb Engine 11"x12" side crank, class G, driving 140" fan, supplying air to boiler furnaces; three 300 K.V.A. shell type single phase 2200-6000 volt transformers; one 18 panel switchboard, which controls generators and power distribution; two 25 K.V.A. single phase lighting transformers 2200-110-220 volts; three 25 K.V.A. single phase Booster transformers. All motors of 50 H.P. and over are 2200 volts, and all below 50 H.P. are 440 volt.

The water supply is taken from Lake Victoria, two miles East of the plant, at 300 feet elevation above high water. The water is pumped over an intervening hill, 270 feet above lake elevation, by two 8", two stage centrifugal pumps operated by two 175 H.P. motors running at 1750 R.P.M. Fifty per cent of the power required to run these pumps is recovered by a water wheel and generator situated at 140 feet elevation above mill site.

The Goggle Problem in a Paper Mill*

By RAYMOND A. STEFFEN

Champion Coated Paper Company, Hamilton, Ohio

AT a time such as the present when the prevention of accidents is so much under discussion and when "Safety First" is the slogan upon the banner behind which all here assembled are marching, it might be interesting to know just how the conservation of eyesight might be promulgated in the Paper and Pulp Industry.

In the United States the total of industrial blind is approximately 15,000 or 13.5% of the total blind population. Blindness resulting from industrial causes being the greatest single cause for blindness.

In the State of Pennsylvania last year, there were 550 eyes lost from industrial causes and this same state reports that since the year 1916, 3,364 eyes have been lost for which compensation to the amount of more than four million dollars has been paid.

In the State of Wisconsin last year there were 826 cases of eye injury for which $482,643 was paid.

During the year 1921 there were no cases of the complete loss of an eye in The Paper & Pulp Industry as far as statistics are obtainable but during the year previous (1920) there were 5 cases recorded.

What is the goggle problem in a paper mill? The first problem is to eliminate as far as possible the necessity of using goggles. Look over your plant and ascertain the number of movements which you might eliminate or the machines you can guard in such a way as to make the wearing of goggles unnecessary. Thus you simplify your problem and at the same time prevent many accidents. Some of these methods will be mentioned farther on.

The second problem is to educate the worker to realize the necessity of wearing goggles whenever a hazard is met. A hard and fast rule to this effect should be issued by the head of the firm and all superintendents, foremen and safety committeemen made familiar with the rule.

It is advisable for each worker to have his own pair of goggles. He may either buy them himself or they may be loaned to him by the firm by which he is employed. Where goggles are loaned to employees it is the best plan to have them issued from your "first-aid" room where possible or some other centrally located point such as your store room department.

Whatever method is employed, make them easy to obtain. We cannot stress this point enough as it is one of the prime requisites of a "wear your goggles" campaign. When goggles are issued, the workman may sign a slip showing that he has borrowed same and in case the workman quits the price is deducted from his pay. To attempt to give every employee free of charge a pair of goggles is an endless job and one which only invites trouble.

At this central distributing station, all broken goggles can be repaired and all goggles be sterilized immediately upon being received. This last is very important. Probably the most simple method is to dip the goggles in a formalin solution made by putting three teaspoonfuls of 40% formaldehyde into a quart of water.

Probably no other industry has such a variety of skilled and unskilled craftsmen with their attendant hazards employed as The Paper and Pulp Industry.

First of these are the Papermakers themselves. In most paper mills these men are subject to acid burns from sulphuric

*Address before the Paper and Pulp Section of the National Safety Council, at the Eleventh Annual Safety Congress, Detroit, August 29, 1922.

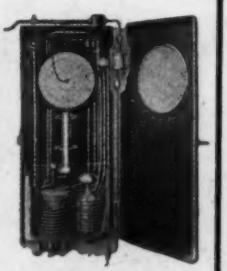
Make your coal pile last longer

Under present conditions it's a matter of self protection to squeeze every bit of useful work out of your coal. Even if you're sure of your present supply, it's up to you to make it last as long as you can.

Foxboro CO_2 Recorders and Temperature and Pressure Recorders are of direct assistance in cutting down heat losses and steam waste. The engineer of a moderate sized public building reports that last winter a **Foxboro-Heath CO_2 Recorder saved him over a ton of coal a week.** Engineers of larger plants tell us of proportionate savings.

Foxboro Instruments are designed, built and tested to give you accurate, unfailing service over a long period of time. Their cost is insignificant compared to the savings resulting from their use.

Let one of our engineers show you just what Foxboro Instruments can accomplish in your plant, while you still have some coal to save. Get in touch with Dept. B.B.



Foxboro-Heath CO_2 Recorder

THE FOXBORO CO., Inc.

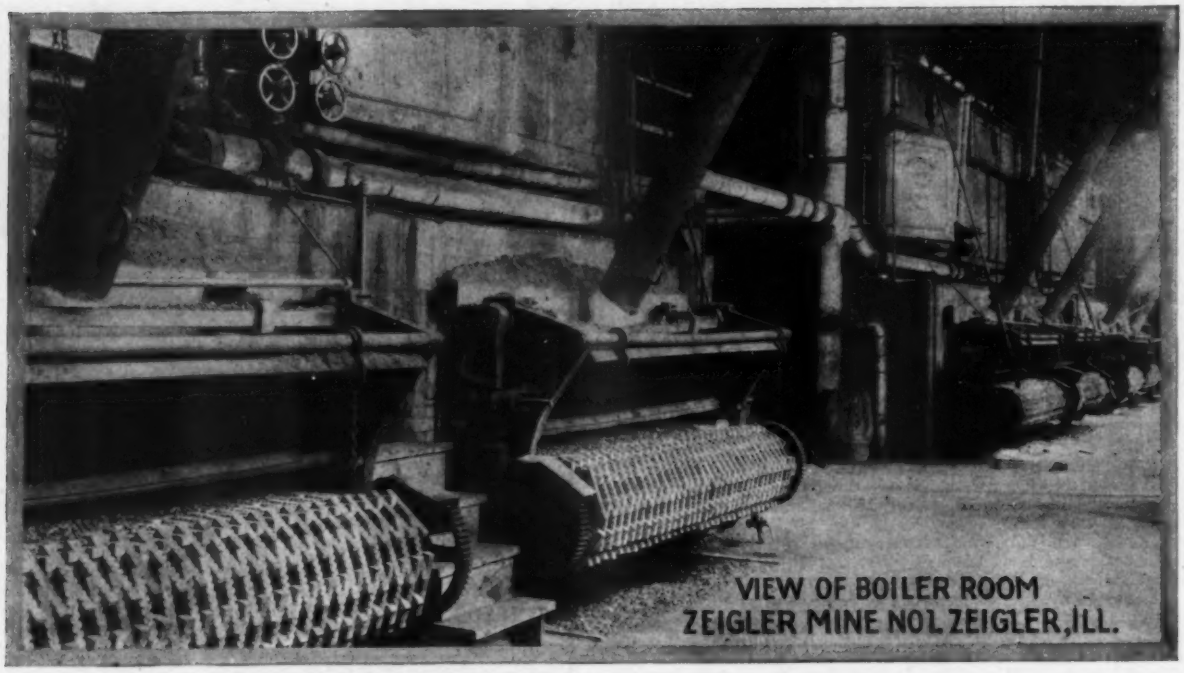
Foxboro, Mass., U. S. A.

New York Chicago Boston Philadelphia Pittsburgh Birmingham Tulsa San Francisco

FOXBORO

TRADE MARK

118-197



Continuous Performance *of* GREEN STOKERS Aided in Breaking Coal Production Records

ORIENT No. 1 and Zeigler No. 1 Illinois mines, broke the world's record for coal production. In the month prior to the coal strike these mines produced the tremendous figure of 326,124 tons of coal.

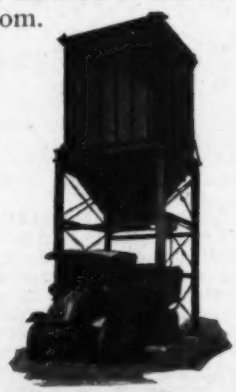
Ten Green Chain Grate Stokers plugged along, night and day, while the two mines strained every ounce of human and mechanical power to establish this record. Now the strike is over these ten stokers will continue their performance and aid in establishing new production records.

Moving ash with measured steam is accomplished by the Green Steam Jet Ash Conveyor equipped with the "Remote Control." Remote control consists of an electrically operated steam valve which is controlled by the man hoeing the ash into the conveyor intake. This provides the quickest, cheapest and cleanest method of ash removal from the boiler room.

Reduced rehandling charges follow the installation of a Green Cast-Iron Hopper. These hoppers are adaptable to practically all plant layouts and can be erected with unskilled labor in short time.

Literature covering these products will be mailed to those interested in efficient boiler room operation.

Green Steam Jet Ash Conveyor



Green Cast Iron Hopper

Green Engineering Company

170 Kennedy Ave.

East Chicago Indiana

Green Chain Grates

Chain Grate Stokers, Ash Conveyors, Cast-Iron Hoppers, Sealflex Arches, Pressure Waterbacks.

acid used in cleaning felts. First, be sure to provide your workers with inclinators for acid carboys or barrels and provide them with suitable goggles to protect their eyes from splashing.

Silicate of Soda is used in paper mills for making splices, etc., and this material has a tendency to crystallize around the edges of the cup or barrel or on the floor. Suitable goggles should be worn when cleaning up any amount of this crystallized material.

Workers around bleach tanks should be provided with goggles when engaged in work which might cause bleach to splash in the eye. Goggles for these three operations should be constructed with rubber frames and lenses of clear optical glass and kept in place with elastic head bands.

Some plants use an over-head crane for transporting rolls of paper from place to place. At our plant we received many complaints from operators because of dust, dirt, pieces of rust, etc., falling from tracks overhead into eyes. This was corrected by providing each operator with light, clear-glass goggles.

Millwrights and machinists employed in paper mills are constantly doing some work which requires eye protection. Pouring molten babbit metal into moulds for bearings with the aid of moulder's clay produces a hazard resulting from steam pockets exploding and throwing molten metal into workmen's eyes.

Here a partial preventive is obtained by the use of several patented preparations to supersede the use of the wet clay. These preparations with a base of asbestos, linseed oil and clay prevent steam pockets. A good strong goggle should also be provided for this work.

Chipping parts of machines, gears, rivets, bolts, etc., concrete floors or foundations also produce a hazard for which goggles are the only preventive. A regular chipper's goggle should be used for this work.

Grinding on emery wheels produces a hazard which can be somewhat eliminated by the use of plate glass shields over wheels and all emery wheels should be so equipped. However if much grinding is to be done you should insist upon light weight dust goggles being worn.

For arc or oxy-acetylene welding the use of colored lenses is necessary to protect the eyes from the ultra violet, intense light and heat. The colors recommended are black, green or yellowish green. The cobalt blue often used is **not** effective.

Goggles for use by firemen in the power plant should also be of colored lenses. The color used to be of light bluish green or sage green to protect from light rays and intense heat. These goggles should also be equipped with elastic headbands.

Workers engaged in tearing down buildings of brick or concrete construction, tearing up floors or repairing concrete floors, or drilling holes in bricks or concrete for expansion bolts, etc., are probably the chief causes of serious eye injuries. Under this heading come common laborers, pipefitters, brick masons, carpenters.

Here good strong chippers' goggles such as recommended for millwrights and machinists should be used. This isolates the types of goggles for paper mill workers to four distinct types; 1—The strong chipper's goggle, 2—the acid and fumes goggle, 3—the colored lense goggle and 4—the dust goggle.

Overcoming Objections

In overcoming objections to wearing goggles, bear in mind that the objector has some real reason for his objection. The goggle used may not be properly fitted to the contour of his face or the goggle may be too heavy for the work at hand or the goggle may not be in good repair.

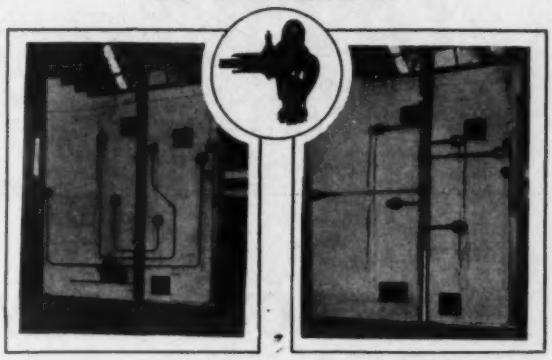
While the greatest objection we have to them is the sweating and fogging of the lenses. As you all know, paper making is hot, steamy work and it is easy to see that this objection is well founded.

To overcome this we are using a glycerine pencil with excellent results. One or two applications of this pencil will reduce fogging to a minimum and readily overcomes this objection.

The next greatest objection comes from the fellow who is not accustomed to wearing goggles. Have patience with this fellow and help him get the goggle properly adjusted to his face and properly cleaned, telling him at the same time the advantages of their use, about his buddy who had a narrow escape from blindness just because he was wearing his goggles at the time a chip or boulder hit him in the face.

Safety bulletins relating to goggles posted on bulletin boards will help you, both those received from The National Safety Council and your home-made ones. One advantage

Diamond Valv-in-Head Soot Blowers Save Two-Thirds Material Required for Installation



With the independent valve soot blower system above there is required 66 feet of pipe for connections to individual units, and six 2" globe valves.

With the Diamond Valv-in-Head System above only 23 feet of pipe is required to connect the units with the main line. All individual control valves are eliminated.

WITH the Diamond Valv-in-Head soot blower system it is possible to save approximately two-thirds of the cost of material required for installation with the independent valve soot blower system. There is an actual saving in pipe of two-thirds, a considerable reduction in the number of fittings and the complete elimination of individual control valves.

On a typical 6 unit installation the bill of material for the independent valve system comes to $195.48, with prices as of October 1st, 1922. With the Valv-in-Head system the complete bill of material amounts to $64.28. The saving effected is $131.20. (Note: Comparison made between bronze body valves with nickel seats and discs for independent systems and Monel trimmed Valv-in-Head.)

This saving in material alone bridges a long part of the difference in cost between the Diamond Valv-in-Head and the independent valve soot blower. Other Diamond Valv-in-Head economies include: a saving of 50 to 60 per cent in steam for operation; a saving of 50 per cent in labor and a reduction in annual maintenance charges of 25 to 50 per cent or more. Remember that Diamond blower elements used in the hot passes of water tube boilers are protected from oxidation at high temperatures by being CALORIZED.

Write for Bulletin 297

DIAMOND POWER SPECIALTY CORPORATION
Detroit-Michigan

Diamond

VALV-IN-HEAD SOOT BLOWERS

PONTACYL RUBY PL CONCENTRATED

for

PAPER DYEING

High concentration and excellent fastness to light, acids and alkalies particularly adapts this dyestuff for use in the paper industry.

Pontacyl Ruby PL Concentrated is equally suitable for use in the beater, for calender coloring or dipping.

It is an excellent shading red when used with the Heliopont Blues for the production of pure, permanent whites.

E. I. du Pont de Nemours & Co., Inc.
Dyestuffs Department
Wilmington, Delaware

BRANCH OFFICES:
New York Boston Providence
Philadelphia Chicago
Charlotte, N. C.

STANDARD DU PONT DYESTUFFS UNIFORM

of the home-made bulletin is that you can quote specific cases of which the workers can verify.

Some safety engineers employ the old but never-failing plan of carrying 2 or 3 glass eyes in their pocket. Finding a man who is doing work which is hazardous to the eye and not wearing goggles, he pulls them out and starts looking from worker to glass eyes. When asked what he is doing he remarks that he is just seeing if he has the same color eye in stock because if the worker doesn't get his goggles on he is going to need a glass eye. This usually breaks the ice for a good safety-first talk on goggles and sells the worker the idea at once.

Once in a great while you will encounter a seemingly hopeless case. One who will argue that goggles are all foolishness, that he has been chipping, grinding and using acids all his life and has never been injured. If after using all known methods to convert him to the use of goggles he fails to respond, it will be best to pay him off and let him go, giving both him and his fellow workers the real reason for doing so.

Discharging workmen for failure to wear goggles is to be discouraged except as I say in exceptional cases.

It is said that there are three classes of men: those who have the initiative to invent, those who understand the invention after it is explained to them and those who do not understand and avoid the explanation. Then according to this we have two-thirds of our workers to check up on and remind them of their danger.

When we stop to think that the eye is involved in 10.6% of all permanently disabling accidents, it is time for us of the Paper & Pulp Industry to get interested in every single individual we see who is exposing himself to a hazard which is easily guarded against.

Meeting of the Cellulose Chemistry Section

The meeting of the Cellulose Chemistry Section, which was a part of the Sixty-Fourth Meeting of the American Chemical Society, held at the Carnegie Institute of Technology, in Pittsburgh, Pa., September 5th to 9th, 1922, proved to be of particular interest to pulp, paper and textile chemists.

Two symposiums on the subjects of "The Constitution of Wood Cellulose" and "The Absorption of Salts by Cellulose" were arranged for and following are abstracts of a few of the papers read at the meeting:

Factors Influencing the Properties of Wood Cellulose as Isolated by the Chlorination Method

By Mark W. Bray and T. M. Andrews

Certain series of pulps made by keeping all cooking conditions as constant as possible except time gave values for alpha, beta and gamma cellulose that did not lie in proper relation to each other. Unless the chlorination conditions are uniform in the preparation of cellulose from these pulps, the character of the cellulose is affected. Therefore, a study was undertaken of the conditions which affect the character of the cellulose as expressed in the per cent alpha, beta and gamma cellulose.

It was found that increasing the temperature and time of chlorination (over-chlorination) increases the percentage of non-resistant cellulose in cellulose derived by the Cross and Bevan method.

There is very little beta cellulose in pulps or wood before it is chlorinated for the preparation of cellulose, except in decayed material. The action of the organisms of decay in some cases is similar to that of chlorination on the character of cellulose.

The copper number of cellulose is a measure of the resistance of cellulose toward 17.5 per cent sodium hydroxide solution, and also of the amount of over-chlorination. The data indicate that beta and gamma cellulose have the same copper number. The ratio,

$$\frac{\text{copper number of the cellulose}}{\text{per cent beta plus gamma cellulose}} = \text{constant.}$$

From the relation of the copper reduction capacity of beta and gamma cellulose, the data indicate that within every three $C_6H_{10}O_5$ complexes there is one aldehyde group.

An Improved Method for the Determination of Alpha, Beta and Gamma Cellulose

By Mark W. Bray and T. M. Andrews

A volumetric method for the determination of the alpha, beta and gamma cellulose based upon the titration of the organic material in Cross and Bevan cellulose has been worked

SOLVAY
STANDARD IN SODA SINCE 1881

SOLVAY ALKALI

SODA ASH 58%
Contains 99+%
Sodium Carbonate

CAUSTIC SODA 76%
Contains 97+%
Sodium Hydroxide

TRADE MARK
REG. U. S. PATENT OFFICE

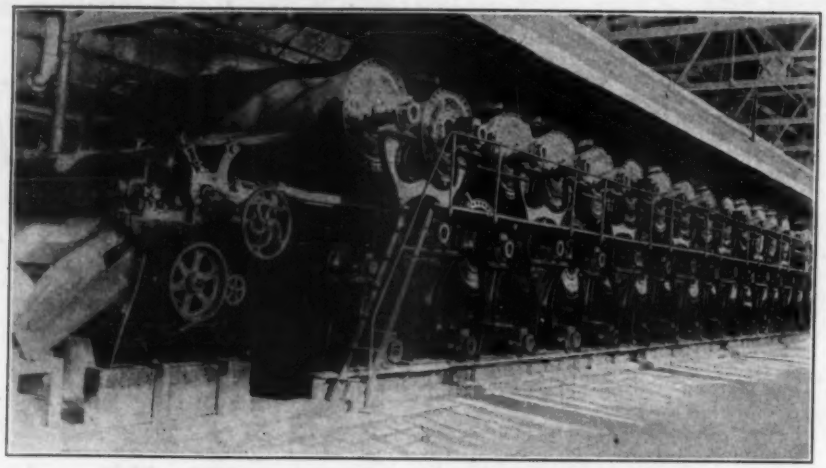
Crown Filler
for
Paper Manufacture

Manufactured by

The Solvay Process Company

FACTORIES
Syracuse, N. Y. Detroit, Mich. Hutchinson, Kans.

SELLING AGENTS
Wing & Evans, Inc.
40 Rector Street, NEW YORK
9 State St., BOSTON 625 Book Bldg., DETROIT
30 N. Dearborn St., CHICAGO



Sturtevant Vapor Absorption System in a Canadian Mill

A Vapor Absorption System is a Necessity today

¶In the above illustration you can see the pipes which contain the nozzles, between the dryers.

¶They are the "business end" of a Sturtevant Vapor Absorption System used in hundreds of progressive paper and board mills throughout the United States and Canada.

¶The vapor is absorbed, immediately it is formed, by the air nozzles running the entire length of the dryer roll.

¶What does this system do? Enables the whole sheet to be dried uniformly; saves overdrying the sheet; saves felts; lessens wastage; increases production; saves excessive press roll crowning—and many other advantages fully explained in Bulletin 243. Write for your copy today.

¶Our Engineers or the J. O. Ross Engineering Corporation of New York will gladly look over your proposition.

HYDE PARK, BOSTON, MASS.

684

out. The separation of the resistant from the non-resistant cellulose is carried out by the treatment with 17.5 per cent NaOH, filtered by suction or centrifuged and washed. The alpha cellulose is dissolved in 72 per cent H_2SO_4 made up to 100 cc. in a graduated flask, an aliquot of which is oxidized with standard $K_2Cr_2O_7$ solution; the excess $K_2Cr_2O_7$ is titrated with ferrous-ammonium sulphate solution. The alkaline filtrate is divided into two equal portions. One portion is acidified with dilute H_2SO_4, causing the beta cellulose to precipitate. An aliquot of the clear solution is oxidized as in the alpha cellulose determination for the estimation of gamma cellulose. The other portion of the alkaline filtrate is used for determining beta plus gamma cellulose. The value for beta cellulose is arrived at by subtracting the result of the gamma cellulose determination from that of the beta and gamma determination.

The volumetric method gives a direct means for the estimation of these three constants, in determining the character of the cellulose. Filtration and washing difficulties of the gravimetric determination are practically overcome. This method is more accurate and can be carried out much more rapidly than the gravimetric method of Cross and Bevan. Check determinations can be made without repeating the Cross and Bevan determination for preparing cellulose, which procedure is necessary in the gravimetric method.

The Gelatinization of Lignocelluloses

By A. W. Schorger

It has been found that lignocelluloses when ground in dilute alkaline solutions attain a high degree of dispersion. The resulting gelatinous product when allowed to dry forms, without pressure, a dense, horny mass having a specific gravity of 1.4-1.5, which is three to five times greater than the apparent specific gravity of the original wood. The peptonizing action of alkali is particularly marked in the case of the hardwoods in comparison with the conifers, the difference being apparently due to the greater hemicellulose content of the former. The cereal straws gelatinize even more readily than woods by the above treatment.

A Study of the Methoxyl Distribution in the Products of the Soda Cook of Jack Pine (Pinus Divaricata)

By S. S. Aiyar

This paper is a continuation of the work on the distribution of methoxyl in the products of wood distillation previously reported. As the period of cook is lengthened, the methoxyl in the pulp gradually falls to a minimum after two hours' cook at maximum pressure. Thereafter, the loss of methoxyl is not very appreciable.

The liquor in its turn gains the methoxyl corresponding to the loss in the pulp so that all the methoxy in the wood used is found on the products at the end.

The volatile methoxyl derivatives in the liquor reach a maximum in half an hour after attaining maximum pressure and then their quantity falls. There seems to be a reversal of the equilibrium as the strength of caustic falls and more woody matter is dissolved in the lye.

The figures for the lignin and methoxyl contents of the pulp calculated to percentage on the lignin and methoxy content of wood run parallel. This seems to be another confirmation for the theory that all the methoxyl is associated with the lignin.

Experimental Work on the Development of a Theory of the Protection of Wood by Preservatives

By E. Bateman and C. Henningsen

Practical methods of preserving wood against the attack of low forms of life require the injection of some material which either inhibits or kills the attacking organism.

A working hypothesis on the protection of wood by preservatives is proposed. It states that wood preservative must possess sufficient solubility in water to produce a solution of lethal concentration. When injected into wood as an oil solution, the active ingredients are distributed in the ratio of their solubilities in water and oil.

The paper, which includes new data on the solubilities, solubility coefficient, and toxicity of mono-hydric phenols, offers experimental proof of the theory.

Notes on the Rosin-Sizing of Paper—(1)—The Reactions Between Aluminum Sulphate and Sodium Resinate "Rosin Size" Solution

By Alfred Tingle

The experimental results obtained may be summarized as follows:

When solutions of these compounds are mixed in stoichio-

Hamilton Top Felts

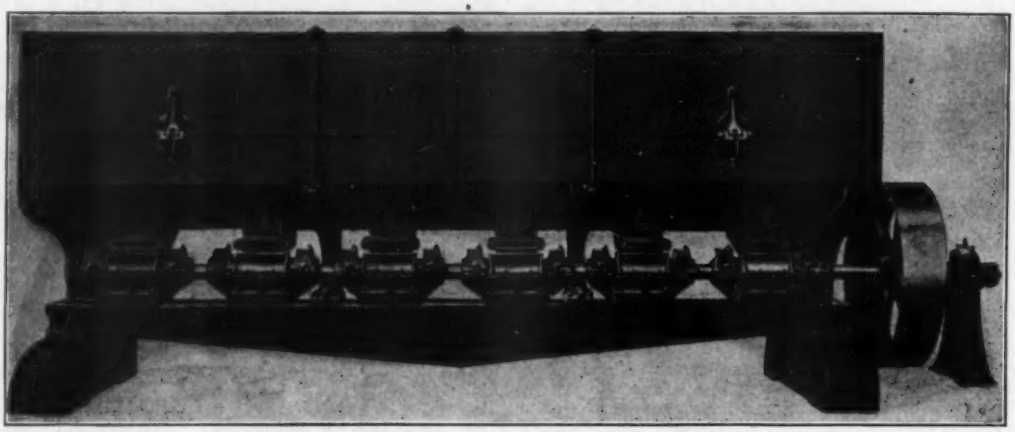
run until worn out, with less trouble of "picking" on machine than any other make of top felts can show. A trial is invited

SHULER & BENNINGHOFEN
HAMILTON, OHIO

Fitchburg Duck Mills
ESTABLISHED 1844
FITCHBURG, MASS.
MANUFACTURERS OF
STANDARD AND MULTIPLE
DRYER FELTS
English Weave in Two, Three, Four, Five and Six Ply—60 Inches to 176 Inches in Width
Fine Faced Felts for Fine Papers. Absolutely no felt marks in paper. TRIBUNE Three Ply Felts for Coarse Papers.

LOCKPORT Felts
EXCLUSIVE MAKERS OF
Paper Makers' Felts
Have You Run Them?
If Not, Why Not?
Are You Interested in Accurate Running Felts?
Give Us a Trial
Get Authentic Information
Ask the Men Who Run Them
Yours for service
LOCKPORT FELT CO., Newfane, N. Y.

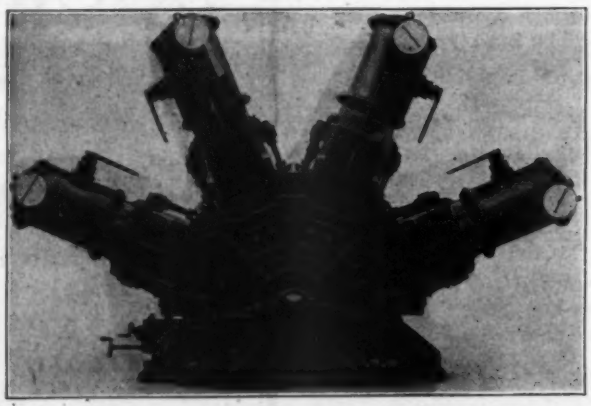
Pulp and Paper Mill Machinery



FLAT SCREENS

Made in All Sizes from 6 to 18 Plates Inclusive

Manufacturers of Screens, 3 and 4 Pocket Grinders, Wet Machines, Disc Barkers, 48″-84″-90″ Chippers, Centrifugal Pumps, Iron, Brass, Bronze and Lead Castings



FOUR POCKET GRINDER

Equipped with All Latest Devices, *including our* Patented Pulp Scraper Between the Pockets

INQUIRIES SOLICITED

Union Iron Works, Bangor, Maine

metrical proportions, precipitation of alumina and rosin is complete. When a considerable excess of aluminum sulphate is used, the precipitate contains no resinate but consists of free rosin acids with less than their equivalent of free alumina. At certain concentrations all the alumina remains in solution, rosin acids only being precipitated. Rosin acids precipitated in this way ("Rosin B") are not in the same physical condition as when precipitated by mineral acids. Addition of mineral acids to this modification of rosin changes it to the more common form ("Rosin A"). "Rosin B" is probably spongy rosin very thoroughly interpenetrated with water.

Notes on the Rosin-Sizing of Paper—(2)—The Process in the Beating Engine and at the Wet End of the Paper Machine

By Alfred Tingle

As commonly carried out, the reaction in the beater results in the deposition of rosin in the form of "Rosin B" (see preceding paper) on the fibre with less than its equivalent of alumina. Most or all of the remaining free alumina is precipitated as the result of subsequent dilution. That alumina plays no essential part in the sizing is shown by the fact that paper can be successfully sized under such conditions that no alumina can be deposited. Rosin acids can be precipitated even by sulphuric acid in a condition closely resembling "Rosin B" if at the same time another precipitate is formed which will serve to keep the rosin finely divided. In such circumstances the rosin has sizing power. Investigation of the changes in size as paper dries are required.

Mannose from White Spruce Cellulose

By E. C. Sherrard

When white spruce wood is hydrolyzed with dilute acid at atmospheric pressure, the quantity of cellulose removed corresponds to the quantity of sugar produced. Since no mannan can be isolated from the wood by the usual methods, the mannose is probably present as a manno-cellulose and not in the adsorbed state. Otherwise, it is difficult to advance an explanation of the removal of a quantity of cellulose corresponding to the sugars produced.

The paper directs attention to the presence of mannose as a product of the hydrolysis of white spruce cellulose and also to the fact that this sugar is distributed through the alpha, beta and gamma celluloses. While the mannose is quite easily removed by means of dilute acids, a part of it withstands the action of alkali and is even found in cellulose reprecipitated from zinc chloride-hydrochloric or cuprammonium solutions.

Mannose has been found in the solutions resulting from the hydrolysis of white spruce cellulose prepared by the Cross and Bevan method, and from soda, sulphate and sulphite processes.

Absorption of Salts by Cellulose

By Wilder D. Bancroft

Though they merge one into another, we can consider four cases: miscellaneous salts; bases and acids; mordants; substantive dyes.

1. We get a water-ring in filter paper with salts of copper, lead, mercury, etc. We get peptization of cotton by ammoniacal copper oxide, zinc chloride, barium iodide, etc.

2. Barium, strontium, calcium, and lead hydroxides may be adsorbed so strongly by filter paper from dilute solutions as to introduce analytic errors. In mercerization, caustic soda is adsorbed and changes the structure of the cotton; but no compound is formed. Mineral acids show no appreciable adsorption at moderate concentrations by titration method.

3. Cotton takes up alumina and chronic oxide only from colloidal solutions. In presence of tannin alum is decomposed. Tannin is adsorbed, but must be fixed by antimony, because it is peptized so readily by basis dyes.

4. Sodium and barium salts of substantive dyes are adsorbed as such. Being colloidal solutions, the adsorption is increased by electrolytes which decrease the stability, and is decreased when these electrolytes coagulate the dye.

New Methods for Measuring the Effects of Temperature and Humidity on the Dimensions of Paper

By Harold S. Davis

Where paper is used for printing purposes, its expansion or contraction between imprints may cause blurring. It is, therefore, of great importance to have a knowledge of the magnitude of the changes in dimension and of the rates at which they take place.

A new apparatus is described in which the humidity and temperature are susceptible to easy control and in which the changes in dimensions of different samples of paper may be accurately measured.

Don't Test Paper *This* Way

Testing paper is too important to gamble on. Yet it is little more than gambling to depend upon the old time tear-test.

A gamble—*and unnecessary*

With the Elmendorf Paper Tester you can accurately test the tearing strength of paper with and across the grain. The Elmendorf Tester works by gravity without springs—and independently of the human element.

Write and let us explain its value to you.

Elmendorf

Paper Tester

THWING INSTRUMENT COMPANY

3353 Lancaster Ave., Philadelphia, U. S. A.

95

EASTWOOD Wire Mfg. Co.

Fourdrinier Wires
Cylinder and Washer Wires

Belleville, New Jersey
U. S. A.

WE ALSO MANUFACTURE

Valves, Unions, Cocks, Fittings, Digester Parts, Castings, etc., for Sulphite Mills from Our Perfection Bronze

We were PIONEERS in making
OSCILLATING, NON-SCORING
FOURDRINIER WIRES

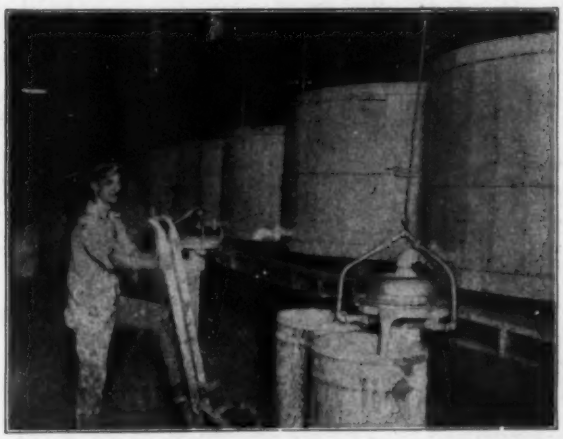
This is one reason why
"Appleton Wires Are Good Wires"

Fourdrinier Wires
Cylinder Wires
Washer Wires
Of brass or bronze

APPLETON WIRE WORKS
Appleton, Wis., U. S. A.

New Style Strainer for Clay Milk

The accompanying illustration of a new electric sifter was taken in the Henry Bosch Company's plant. This has a capacity for straining 800 to 1,000 gallons of clay-milk every hour through a No. 80 riddle and is a typical instance of human



ingenuity as applied to a constant speeding up of work through the application of labor saving machinery in industries. There is a special strainer riddle attachment enabling this sifter to handle liquids, with considerable capacity both above and below the screen.

The peculiar vibrating motion of this sifter, it is claimed, really makes a better mixture and does more perfect straining than any method now in use. Lumps are quickly broken up by a rapid vibrating motion and the desirable portion of the liquid or the semi-liquid mass is just "shimmied" through.

Reducing and Standardizing Steam Jet Ash Removal Costs

The problem of ash handling from the boiler room has been considered a routine drudgery of the worst kind—dirty and dusty, hot and unattractive, haphazard and costly.

With the introduction of the steam jet ash conveyor the operator was relieved of the dirty and disagreeable features, but the steam consumption was a variable quantity. Even with the newest of equipment steam consumption would exceed expectations.

This condition of uncertainty of steam consumption has been met it is claimed by a remote control feature which measures the steam and controls the human element in operating the steam jet system.

Briefly this remote control consists of an electrically operated steam valve; a steam operated water valve and an air flow meter with a clock and chart.

Its operation is as simple as the ordinary steam jet system with the added insurance of control of steam flow and a record of how the ash removal has been accomplished.

When ready to hoe ashes into the intake the operator puts his foot on a button or board and closes an electric switch with his foot. The closing of this switch operates a solonoid in the steam valve leading to the steam jet nozzle. The solonoid opens the steam valve. Located between the steam valve and the steam jet nozzle is a steam line which connects the main steam line to a water spray nozzle. Pressure of steam in this steam line opens the water valve and the water spray functions.

As soon as the operator lifts his foot, the switch opens automatically; steam pressure closes the electric valve; and the water valve closes because of lack of steam pressure.

The air flow meter gives a permanent record of the minute by minute suction maintained on the system. It tells the story if the operator lays a brick or stone on the switch and permits the steam to flow while he is not hoeing ashes into the system.

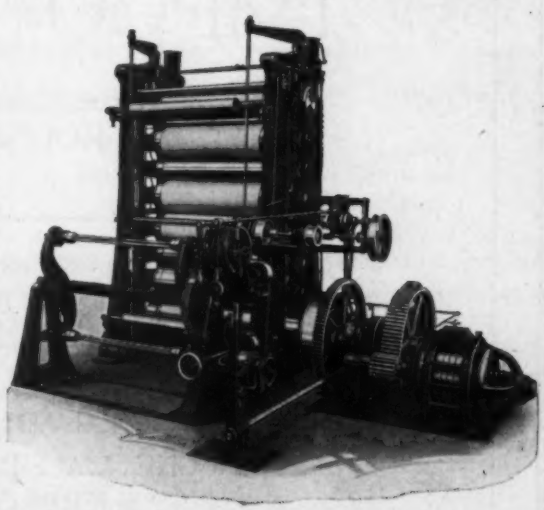
A Self-Fitting Key

In the paper industry, keys are used to make the driving connection between shafts and couplings, gears, sprokets, pulleys, etc. It is usual to mill or slot the keyway in the shaft and to slot the keyway in the external member. But both of these keyway sizes will vary slightly, and to obtain the desired tightness between the key and keyways it has been

E. M. CROSS MACHINE CO.
Berlin, N. H.

Machinery Specialists
for Pulp and Paper Mills
Including Vacuum and Centrifugal Pumps

NORWOOD
SUPER CALENDERS



WE ARE SPECIALISTS IN
Paper Finishing Machinery

NORWOOD ENGINEERING CO.
FLORENCE, MASS., U. S. A.

IMPROVED PAPER MACHINERY CO.

NASHUA, NEW HAMPSHIRE, U. S. A.

"IMPCO" CENTRIFUGAL SCREEN
Over 500 in daily use

"IMPCO" KNOTTER [for first screening]
Over 400 in use on all kinds of stock

"IMPCO" TAILING SCREENER
50 sold this year

"IMPCO" REFINER
New—Just introduced

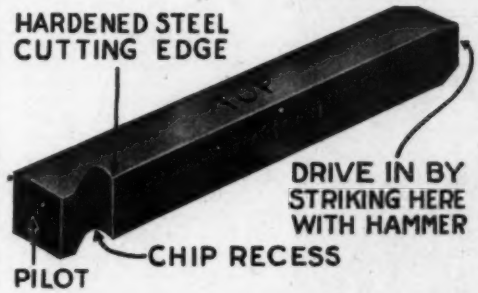
Together Make our Closed System
for GROUND WOOD *Pulp*

We develop our own machinery, know how to build it and make it give real results in your mill----Correspondence a pleasure

CANADIAN FACTORY
SHERBROOKE MACHINERY COMPANY, LIMITED
SHERBROOKE, QUEBEC

necessary to carefully fit the parts together. This has usually been done by hand, either by filing the key to fit the keyways or by filing or scraping the keyways to fit the key.

It usually takes a good mechanic three to four hours to fit an ordinary 1½" x 1½" key. A key slightly smaller, say 1" x 1", may require only two hours and in exceptional cases may be fitted well enough in an hour. But the mechanic needs



to be experienced and the key and keyways need to be almost the right size to start with in order to obtain even these results. Such hand fitting generally is quite expensive work and the results are not always satisfactory.

In the new self-fitting keys, a tough chisel stock is used and this is ground to a size very slightly larger than the nominal keyway width. A cutting edge and chip recess are provided near the front end of the key. Ahead of these is a pilot slightly smaller than the nominal keyway width.

To install one of these keys, the pilot is entered first with the cutting edge at the side. Then the key is driven home with an ordinary machinist's hammer or with a sledge, depending upon the size of the key. The cutting edge sizes the keyways to make a tight fit between the body of the key and the keyways.

In the larger sizes, cutting edges are sometimes provided on both sides. When it is desired to fit top and bottom as well as on the sides, a cutting edge is also provided at the top. Gib keys and other modifications can be furnished as required, all with this self-fitting advantage which saves the cost of hand fitting and which always provides that the key will be a tight fit in the keyways.

New Bulletin on Underfeed Mechanical Stokers

An unusually interesting and illuminative bulletin on underfeed mechanical stokers has been gotten out for the trade by the Detroit Stoker Company. This bulletin, beautifully printed and illustrated, represents technical facts regarding this type of stoker as well as a demonstration of dollar and cents value.

A comparison of hand fired and mechanical stokers is especially interesting to engineers while the results of economies effected in actual practice are of interest to executives. To an advertising man the keenest interest in the bulletin lies in the manner of its preparation, the beauty of its cover and the clean-cut illustrations which are used profusely to demonstrate some point in question.

A new 44 page catalog on air washers has just been issued by the B. F. Sturtevant Co., of Hyde Park, Boston, Mass. It is interestingly illustrated and shows various details of construction by which air for any building or for any industry is thoroughly washed and tempered before entering the building. The motors and pumps are also described and illustrated. More than twelve pages are devoted to various tables giving dimensions, psychrometric charts, diagrams, relative humidities and other useful data.

A series of bulletins which have been gotten out by the Joseph W. Hays Corporation in the interests of their customers, have an educational as well as commercial value in the subjects handled as well as in the preparation of the material. Believing, as do we all, that a satisfied customer is the best advertisement, they undertake to prevent complaints by anticipating them.

That business is fast returning to normal in the paper goods division of the paper and pulp industry, was stated by the American Paper Goods Company of New York recently. This company, successors to the Robert Gair Company, in addition to a vast production daily in envelopes manufacture various paper goods articles.

Remember
WM. A. HARDY & SONS
FITCHBURG, MASS.
Originators and Oldest Manufacturers
OF THE
Cast Bronze Screen Plate
ALSO SPECIALIZE IN
Acid Resisting Digester Parts

UNION SCREEN PLATE CO.
Fitchburg, Mass., U. S. A. Leaneaville, P. Q., Canada
[redacted]
UNION BRONZE SCREEN PLATES
(Best phosphorized Cast Metal)
Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed
The Witham Screen Plate Fastener, Patented
THE ORIGINAL THE BEST

Ticonderoga Machine Works
TICONDEROGA, N. Y., U. S. A.
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
(PATENTED)
WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties
SEND FOR OUR BULLETIN

SCREEN PLATES *and*
DANDY ROLLS
Watermarking a Specialty
Central Manufacturing Co.
The Quick Service House
KALAMAZOO MICHIGAN

Progress and Papermaking

No. 4

When "s" Was Written "f"

IT IS INTERESTING to look at some of the letters and documents of grandfather's day. The ink is a rusty brown and the "s" is written "f." The business documents are quaintly worded and letters are folded and sealed with wax, to be sent without an envelope.

But a change had taken place. There was enough paper at last to come into the possession of the common people. Plain folks sent letters to each other. Little business men kept ledgers. The counting house was without a typewriter and the adding machines were human but the germ of business efficiency was there. Men were using paper in quantity.

And before very long they were using it for advertising. The business card of grandfather's day with its imitation pen flourishes and curving lines of type, has grown into process color work in the advertising pages of the magazines.

HAMMERMILL PAPER CO., *Erie, Pa.*

NEW YORK OFFICE, 291 BROADWAY

Gregg Pump Company Moves to Kalamazoo

With the installation of the Gregg Pump Company in its new factory site at 1417-25 Fulford Avenue, Kalamazoo adds a new industry to its already large list. This move on the part of the Gregg Pump Company is not a new plan but has long been contemplated by them. It has been rumored in various places that certain inducements made Mr. Walter S. Gregg, president of the company, may be in some measure responsible for the final decision to transport the factory. Moving such an organization, including equipment, pump patterns, machinery and all the regalia that encumbers a plant, is no small accomplishment, but the officials of the Gregg Company feel that the results attained will more than compensate for the effort involved.

When Mr. Walter Gregg attended the convention of paper mill superintendents in Kalamazoo last June, he spoke then of having the matter under consideration. He felt that he would be better able to serve the interests of the paper industry were he established in their midst as he will be in the Kalamazoo Valley. He also felt that a great handicap to contemplated expansion would be removed if the long freight haul from Kansas City, Missouri, could be eliminated, and that, in addition, he would be better able to look after his Chicago interests by being in closer contact with them, and by the establishment of a Chicago sales office.

All of these things were taken into consideration by the Gregg Company before the move was finally decided upon. The attractive site secured by the organization in Kalamazoo is an added inducement. The plant is in the heart of the new manufacturing district, just a short distance from the King Paper Mill. The property consists of about an acre of ground, with a large two-story brick building and blacksmith shop, which gives ample room for expansion. There is a private switch from the Pennsylvania Railroad to the plant, while a finely paved street with an electric car line leads directly to the office doors. This is the property formerly occupied by the Reed Foundry & Machine Company, and which was vacated by them when they moved into their own new building. It is, therefore, ideally equipped for the housing of the Gregg Company.

Mr. Gregg has already begun to beautify the grounds, and put the buildings into first class shape, so that his factory will be an addition to the civic appearance of Kalamazoo, and the entire organization contemplate with satisfaction this removal. They only express their combined and fervent hope, however, that this will be the last move of the Gregg Pump Company, although the warmth of their welcome in their new location should compensate to some extent for the hardships endured.

Paper & Pulp and Allied Associations to Meet in Chicago During Paper Week

Plans for the conference of Paper and Pulp Manufacturers and affiliated associations which takes place in Chicago during the week of October 16th to 20th, the period officially designated as Paper Week, are practically completed. Arrangements have been made, under the certificate plan, to secure reduced rates for all those who wish to avail themselves of them. This will afford a substantial saving in railroad fares for convention visitors.

Thursday, the 19th, is the day of the general meeting of the American Paper & Pulp Association and of the joint luncheon of the American Paper & Pulp Association and the National Paper Trade Association. Various divisions of paper manufacturers have arranged meetings to be held simultaneously, while the Chicago Salesmen, who are taking charge of the social side of Paper Week, have made special efforts to secure a large attendance of paper mill executives in order that, in addition to enjoying the entertainment features, they may secure a proper perspective of the work being done by the salesmen to improve marketing methods in the paper industry.

Chicago Salesmen Co-operating

The Chicago Salesmen, in addition to providing the entertainment features, are arranging for the convention sessions, speakers, and a general hospitality committee. They feel especially pleased with the fact that in addition to ex-Governor Lowden of Illinois, they have secured Edgar Guest, the noted poet and humorist, and Dr. George Craig Stewart, chaplain of the Salesmen's Association of the Paper Industry, who will talk on the work of the salesmen and its relation to the success of the American Paper and Pulp Association of which the salesmen's organization is a part.

A joint luncheon between manufacturers and merchants has been planned for Thursday, while the Tuesday banquet to be given by the salesmen is expected to be the central social feature of the week. It is anticipated that at least five hun-

WAUSAU SULPHATE FIBRE CO.
MOSINEE, WISCONSIN
TRADE MARK
COPYRIGHTED

Cut down *excessive* wrapping paper investment. Why carry two wrapping paper lines for one wrapping paper *purpose?*

MOSINEE

presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

Mosinee Kraft

"The Wrapper that Delivers the Goods"

GREGG

Heavy Duty Deep Well Propeller Pump

Gregg Vertical Electric Driven Deep Well Pump Installed for Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., in 1920, Replacing an Air Lift System and Delivering Four Times the Amount of Water

MANUFACTURED BY

GREGG PUMP COMPANY

127 and 129 Southwest Blvd. KANSAS CITY, MISSOURI

dred will be present at this, which will be given in one of the banquet rooms of the Drake Hotel.

The educational and financial value of such meetings as these cannot be overstressed, to which fact the constantly increasing attendance fully attests. Problems are thrashed out, suggestions considered, perspectives adjusted and differences in viewpoints regulated, in addition to which the individual returns to his home stimulated and keyed up from contact and association with his fellow craftsmen.

Constant and Closer Co-operation

The increasing efficiency of operation in the paper and pulp trade is exemplified to a marked degree by the stress being laid on the need of closer relations among all allied divisions of this great industry. A special effort is being made to secure the attendance of all western and middle western paper mill foresters at the Paper Week Convention by the Woodlands Section of the Association, while any number of various divisions of manufacturers are planning on meeting in Chicago at the same time.

The result of this constant educating of the Association members as to the definite results secured by close co-operation along allied lines is now being appreciated in the weight of public opinion that can be brought to bear upon the establishment of the Federal Fact-Finding Commission, which is to be established by President Harding to sift facts and figures as relating to the present coal situation.

The difficulties of securing a non-partisan body of this type can readily be appreciated, but the weight of public opinion is such that only a non-partisan body can satisfy the demands of the consumer. Appreciating this, and the need of the President of the support of all outstanding organizations who operate ultimately to the civic good, the American Paper and Pulp Association, through its Executive Secretary, Dr. Hugh Baker, has sent the following letter to President Harding.

The Federal Fact-Finding Coal Commission

"The manufacturers of paper are very large consumers of coal. As with other industries consuming large quantities of coal they have been affected, often seriously, by disputes between the coal operator and the miner. Our manufacturers have appreciated very keenly the suggestion made by you in your recent speech, that the Commission to investigate all phases of the coal industry should be a non-partisan body, on which neither coal operators nor miners nor their representatives should have a place.

"This national association, representing paper manufacturers from Maine to California, through its executive committee, urges that the Federal Fact-Finding Commission which will investigate the coal industry be truly a non-partisan body, upon which there shall be representation neither of the coal operators nor of the miners.

"We believe that the people of the country will have great confidence in a non-partisan Fact-Finding Commission, and that this confidence will reflect in a very satisfactory way upon our return to reasonably normal times."

Northwestern Division Superintendents Meet

A meeting of the Northwestern Division of the American Pulp and Paper Mill Superintendents' Association was held at Menasha, Wis., Saturday, September 16th, with about fifty valley mill heads in attendance.

The delegates met at Hotel Menasha at noon, adjourning to the Menasha Printing and Carton Company gymnasium for a business session, after which the entire group attended the Menesha-Appleton Wisconsin State league ball game.

In the evening the group dined at Terrace Garden Inn, where dancing was also enjoyed.

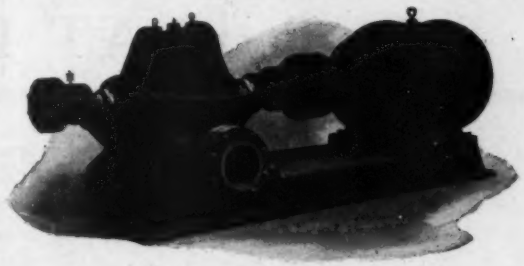
Forest Experiment Stations Asked for New England and Lake States

The Woodlands Section of the American Paper and Pulp Association, the department devoted to the practice of forestry, has asked governmental authorities to secure the establishment of forest experiment stations in New England and in the Lake states, to study problems relating to the growing of pulp wood for the paper industry, as well as timber for building construction.

The establishment of these stations, it is believed, would, through investigations by forest service experts, develop information of the greatest value to the paper companies which are endeavoring to practice forestry on their cut over lands, as well as to protect the timber now standing from devastation.

The Woodlands section believes that New Hampshire would

Aurora Centrifugal Pumps



Type OMD

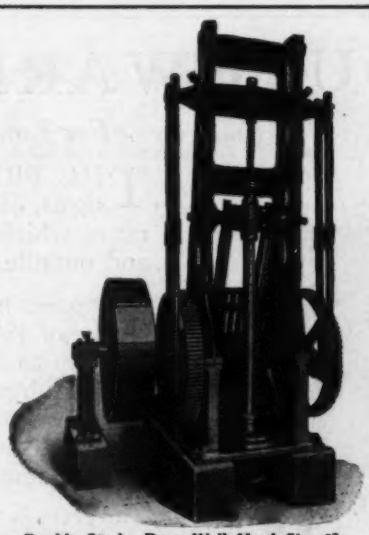
Aurora pumps are made in many types, to meet all conditions found in the paper mill field.

We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.

A card from you stating your conditions places our engineers at your service and results in a saving to you.

AURORA PUMP & MFG. CO.

Home Office and Factories, Aurora, Ill., U. S. A.



Double Stroke Deep Well Head Size 3L, Arranged for Belt Drive.

Write for Bulletin 27-C

A. D. COOK, Inc.

Lawrenceburg Indiana

Manufacturers of Single and Double Stroke and Double Acting Steam and Power Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a Full Line of Water Well Supplies.

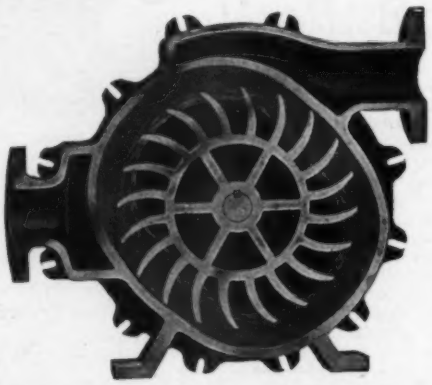
The accompanying half tone shows the design of our Double Stroke Deep Well Power Head, which is the most efficient Type of Deep Well Plunger Pump.

THE HYTOR VACUUM PUMP FOR FLAT BOX SERVICE

Vacuum Produced Absolutely Without Pulsation

No Vibration

Saves Wires



Only One Moving Part

No Rods, Pistons, Crank Shafts, Loose Moving Parts, and No Gears

No Expert Attendance

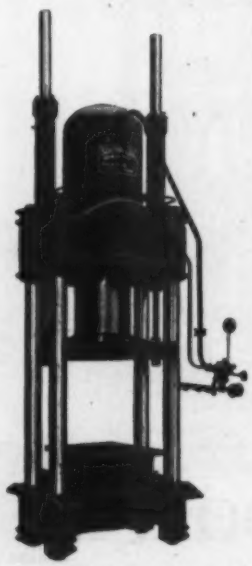
Western Representative
T. H. SAVERY, JR.
1718 Republic Bldg.,
Chicago, Ill.

The Nash Engineering Co.
WILSON POINT ROAD
SOUTH NORWALK, CONN.

New England Representative
G. H. GLEASON
185 Devonshire St.
Boston, Mass.

SOUTHWARK PULP PRESSES

For Long, Hard Service and Economical Operation



600-Ton Pulp Press

THE PRESS illustrated is typical of our improved designs, of all steel construction with the exception of the rams, which are chilled iron ground on the working surface and outside packed.

This press has pressing table 33″ wide by 46″ long, with ram stroke of 48″. It is designed for any standard working pressure up to 3500 lbs. Special sizes can be furnished to suit any requirements. These presses are equipped with Southwark two pressure three-way valves of forged body spindle type for controlling. Either the two pressure or single pressure system may be had.

The press is provided with bottom pressing table and improved drop track which does not require manual control.

We also build sulphite presses, baling presses, pumps and accumulators for the pulp trade and carry in stock a complete line of hydraulic valves, fittings and pipe.

It will pay you to have our quotations on your requirements.

SOUTHWARK FOUNDRY & MACHINE CO.
PHILADELPHIA PENNSYLVANIA
Branch Offices: Fisher Bldg., Chicago; Swetland Bldg., Cleveland

be the best field for the New England station, because its forest lands are typical of the pulp wood forests of Maine, New York, New Hampshire and Vermont, the four states which a New England laboratory would serve, and because there is already a national forest in the White Mountains.

The Woodlands section has not specified the state which it thinks should be selected for the Lakes states station, but wants a location where the problems of Michigan, Wisconsin and Minnesota can be studied.

In taking this action, the American Paper and Pulp Association's forestry department, composed of technical foresters and practical woodsmen, urges that the government give the aid of its technical research men to the study of problems in which the company foresters would co-operate, so that a governmental agency can co-ordinate the efforts of the private foresters.

Waste Material Association to Hold Own Auctions

Among the new activities initiated by the National Association of Waste Material Dealers at their quarterly convention in New York at the Hotel Astor was the laying of plans for the formation of an exchange which will hold meetings twice a month at which auction sales will take place. According to present advices it is expected that a substantial number of members will take membership in the exchange, which will greatly facilitate trading, both through private and auction sales.

The inauguration of such an exchange in an American organization is comparatively new. Although the institution has been used in European associations for some time with great success most of the efforts made in this line in America had resulted in failure it is said. Confidence is felt in the success of the establishment of an exchange in this association which is peculiarly adaptable to it and will benefit by it.

Papermaking Potentialities Compared

The following table, comparing the various papermaking potentialities of different countries insofar as the relation of the forest areas compare to the entire area of the nation, compiled from various press reports of the past month, may give some idea of the future possibilities of the industry:

Country	Percentage of whole area of nation
United States	26 per cent
Poland	23 per cent
Norway	22 per cent
France	18 per cent
Germany	26 per cent
Russia	31 per cent
Canada	33 per cent
Sweden	47 per cent
Finland	57 per cent

Japan, of course, is also to be reckoned with, but in absence of any specified comparison the following figures regarding Japanese pulp production may be of interest: in 1921 thirteen companies operating twenty-eight mills show a decided decrease over seventeen companies operating thirty-one mills in 1920, while the total output of pulp decreased from 268,261 tons in 1920 to 250,027 tons in 1921. The great financial depression in Japan during 1921 is, however, responsible for the decline in production and the 1922 output shows indications of an increase of 30 per cent over that of 1920.

Imports, Exports and Production

Statistics and comparative figures for the past four years show the following conditions prevailing in the industry, as relates to the import and export of paper and pulp:

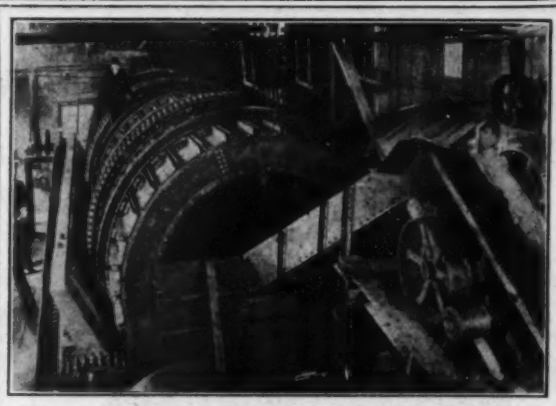
Year	Imports of Paper	Imports of Wood Pulp	Exports of Paper	Exports of Wood Pulp
1913	$24,359,827	$15,935,517	$21,174,217	$ 738,451
1919	53,602,174	37,048,381	86,983,063	3,048,491
1920	84,686,852	89,418,185	89,072,289	2,947,267
1921	92,462,472	39,396,159	49,494,822	1,754,639

In addition the following figures prevailed for the first seven months of the present year:

1922	$48,739,478	$30,663,077	$13,826,330	No figures

The above figures were coordinated by the American Paper & Pulp Association.

A new fast pink and a fast blue dye, both of which it is claimed are suitable for use in dyeing paper, have been developed by the Du Pont De Nemours Company. The pink is said to be good for producing bright pinks of good fastness to light and acid, and of fairly good fastness to alkali, while practically the same characteristics are claimed for the blue. Both are printed by the usual methods for direct colors and are easily discharged to white with sulfoxylates.



THE PAULSON CONTINUOUS BARKING DRUM —made in Manitowoc—is a time-tried machine and working daily and giving very satisfactory results—at low cost. The machine is made up of two or more independent units, each a complete barking drum with tires, rolling mechanism, and driving gear, mounted in line and rotated by one common shaft.

We have secured the exclusive rights to manufacture this drum. The same good material and workmanship that has made the Manitowoc Digester famous, goes into the Paulson Barking Drum.

A capable Engineering Staff is ready to investigate your barking problem. Wire today for circular, capacities and estimates.

MANITOWOC ENGINEERING WORKS

"Digester Makers Since '91"

Manitowoc, Wisconsin

Reclaiming Machinery

for the recovery end of soda and sulphate pulp mills, including:

Diffusers	Digesters
Causticizers	Incinerators
Disc evaporators	Melt Tanks
Leaching batteries	Smelters

Send for list of Kraft mills using Swenson equipment.

Evaporator Bulletin E-122 on request

Swenson Evaporator Company
(Subsidiary of Whiting Corporation)
Main Office and Works: HARVEY, ILL.
(Chicago Suburb)
Sales Dept.: 845 Monadnock Block
CHICAGO
Representatives in 25 Principal Cities

SWENSON

The Machine You Have Been Waiting For—

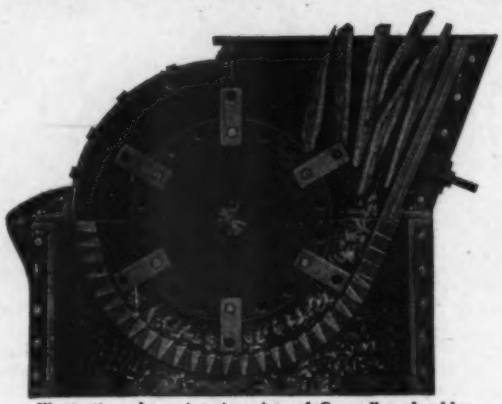


Illustration shows interior view of Gruendler shredder

EVENTUALLY you are going to shred your Pulp Laps (both Chemical and Mechanical), because it is the short route to the Stock Chest. Naturally you are going to want the best shredder obtainable and the GRUENDLER fills that need, because whether Frozen, Dry or direct from the Wet Machines (regardless of the moisture content) the GRUENDLER will handle it in capacities to suit the requirements of your mill.

We have shredded for others and met their specifications in every way—in order to prove to you, will you kindly send us samples of the stock you wish shredded and allow us to put it through the GRUENDLER "Tornado" and prove this claim. No GRUENDLER is a sale, unless it "makes good" in your plant, at work on your stock and we know what a GRUENDLER will do, but we want to show you and let you convince yourself. More than 35 years of successful manufacture of crushers, shredders and grinders, with some of the largest manufacturers of this and other countries as users, make us know that the above claims are well within bounds.

GRUENDLER PATENT CRUSHER & PULVERIZER CO.

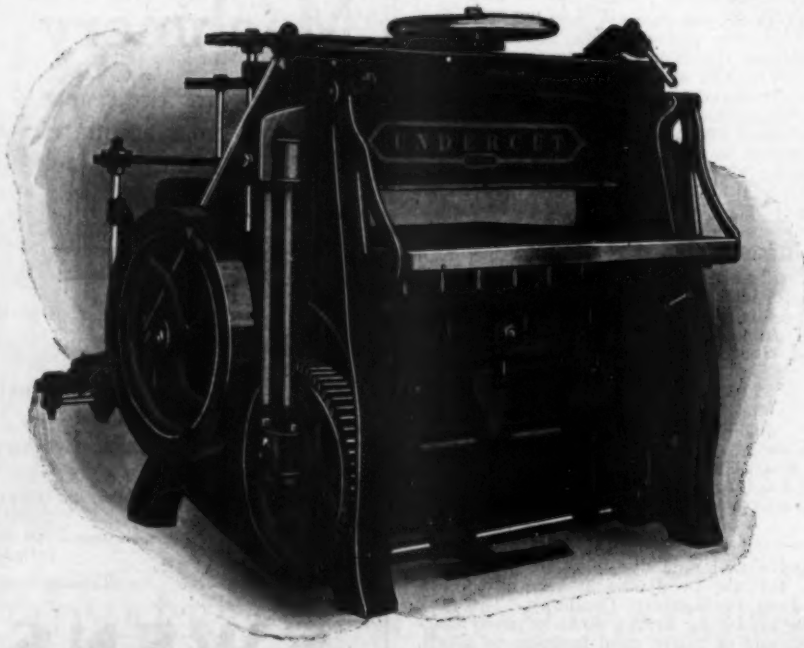
1st and Franklin Avenue, ST. LOUIS, MO.

The Smith & Winchester Mfg. Co., South Windham, Conn.

Paper Making Machinery

Unexcelled in Simplicity of Design Workmanship Accuracy and Safety

May we send you our New Cutter Bulletin 500-22



Paper Bag Making Machinery

Automatic Clamp and Power Back Gauge Starting and Stopping Device Two-Hand Throw in Lever

OUR 48-INCH HEAVY CUTTER

Ream Cutter——**THE UNDERCUT**——Paper Mill Trimmer

"Best Sellers" in Paper & Pulp Industry

A recent decision on the part of the Hotel MacAlpin of New York City, to install a business library consisting of ten text books for each of the twenty leading industries in this country for the benefit of its patrons, has resulted in an interesting compilation by some of the leading paper and pulp manufacturers of what they consider the basic books in their industry.

Two works which have almost unanimous choice are the five volume textbooks on the Manufacture of Pulp and Paper, published by the McGraw-Hill Book Company, Inc., of New York City, and the single volume by G. S. Witham, Sr., on Modern Pulp and Paper Making, which is published by the Chemical Catalogue Company, Inc., also of New York.

In addition to the general choice of the two books mentioned, is the almost unanimous advice, by the different manufacturers answering the request of the Hotel MacAlpin, that the young man should first read the kind of books tending to make his business interesting before attempting the technical books which are designed to supplement his practical experience.

Twenty Thousand Annually for Advancement of Chemistry

It was announced at the Pittsburgh meeting of the American Chemical Society that an annual prize of $25,000 was to be established by the Allied Chemical and Dye Corporation to be awarded the chemist in the United States who, in the opinion of the proper committee, shall have done the most to advance the science of chemistry in the world. This prize shall first be awarded in 1923 and every year thereafter. The donors have provided that a special committee of five, consisting of Dr. Smith and four others to be chosen by him, shall formulate rules and organize the first jury of award. This jury, it is further provided, shall consist of seven members, five to be appointed by the aforesaid committee, and two by the Allied Chemical & Dye Corporation. The prize, which is available to workers in all fields of chemistry, is to include teaching as well as research.

The establishment of this generous foundation in an industry as closely allied to the paper and pulp industry as is this one, calls for generous acknowledgment of the addition of another milestone along the broad highway of achievement.

Course in Practical Paper Making Offered in England

In the Manchester College of Technology, at Manchester, England, classes for technical instruction in the manufacture of paper have been prepared. The courses offered include both class and shop instruction in practical paper-making, dyeing and finishing, as well as general experimental and research work.

British paper and pulp manufacturers, feeling the need of building up their industry by every means within their power, are endeavoring to install the most modern and up-to-date methods in their factories. Courses such as these offered by the Manchester College, which are available both to London City and Guilds students, react towards increased efficiency in the trade, and have the hearty encouragement and support of the leaders in the industry.

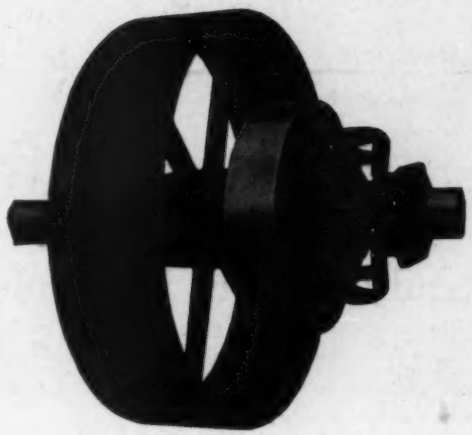
Method to Preserve Newspapers Perfected

Eight years of experimenting, participated in by three big New York newspapers at a cost of $5,000 a year each, under the supervision of the New York public library, has taught librarians how to preserve for posterity newspaper files. The solution, which seems simple, consists of mounting each newspaper sheet between two sheets of thin Japanese tissue, thus shutting the air from the original sheets, reducing its legibility but slightly, and strengthening the page. Bound volumes of the mounted pages are now in constant daily use, and are free from the wear and tear which destroyed the untreated newspapers.

The New York experiments have been so successful that a big Western newspaper has sent representatives to New York to study and adopt the practice for use there.

The first investigation was made in Boston, and the library there tried to persuade the newspapers to print library editions on an extra paper, but the expense was too great. This is now done by a London paper, and was tried by a Brooklyn paper, but the cost was prohibitive.

In the New York experiments, silk was first used, but the Japanese tissue was found the best for the purpose, as it hermetically sealed the newspaper pages from the air. Shel-



UNIVERSAL GIANT

A Thoroughly High Grade Friction Clutch

The Universal Giant is a thoroughly modern, high-grade Friction Clutch—compact in form, unusually strong, easily applied and readily adjusted. It is complete within itself and does not require specially constructed appliances to be fitted to it.

Being made with an extended sleeve of standard diameter, an ordinary pulley, gear, rope sheave or sprocket of regular dimensions can be used by simply keying it on sleeve of clutch. It is only necessary that bore be the same as diameter of sleeve.

May we send you our catalog?

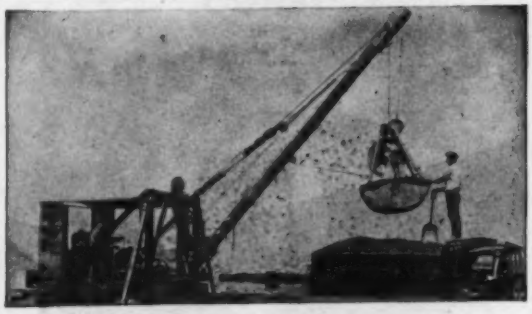
It contains some interesting and useful data on POWER TRANSMISSION APPLIANCES and the problems which beset the user.

T. B. WOOD'S SONS CO.

CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY

BYERS



Small Investment— Steady Returns in Service

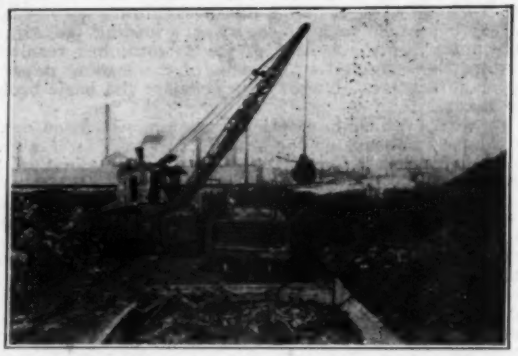
It doesn't cost much to buy a "Truckrane" and the minute you set it to handling coal and doing other plant jobs, it begins to pay handsome returns on the investment. With its one-half yard bucket it will empty gondolas, reclaim coal, load trucks, etc., at an amazing rate.

"Truckrane" will fit any 5-ton or larger truck measuring 8 ft., 10 in. from back of driver's seat to center of rear axle. Any old, worn-out truck will answer. Write for particulars.

THE BYERS MACHINE COMPANY
311 Sycamore St. Ravenna, Ohio

Sales Agencies Everywhere

TrucKranE



Industrial Crane Cuts Force 75%

Users of "INDUSTRIAL" Locomotive Cranes report: "Three men and our type E 'Industrial' now do work which formerly required twelve men."

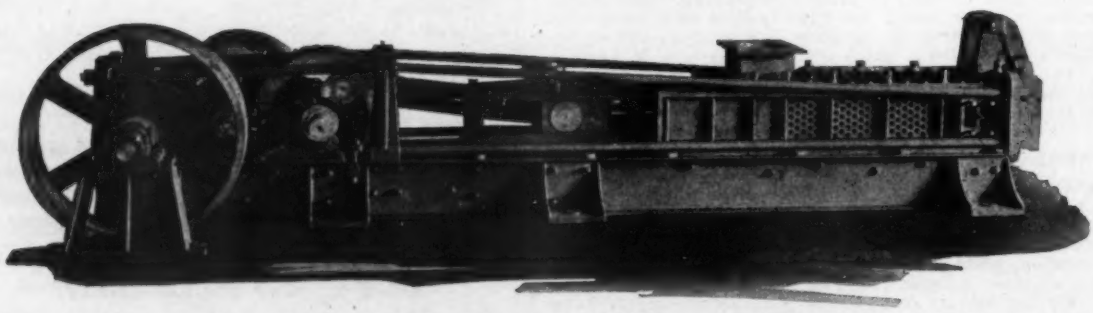
"OUR 'INDUSTRIAL' paid for itself during the first year's operation—saving $15.66 per car loaded over hand labor."

"With the $7,200 that it would take to pay the wages of six laborers for a year, we can pay the cost of operating the CRANE, including the operator, the interest on the money invested and the depreciation, and can do many times the work of six men and do work that it would be impossible to do in any other way without great cost."

Take a look around your plant and consider whether an INDUSTRIAL could save money for you as it has for the above people. Names will be furnished upon request.

INDUSTRIAL WORKS
BAY CITY, MICH.

THE GIANT NEKOOSA BARK PRESS



This machine, driven by a 25 H. P. motor, presses wet spruce bark 52% bone dry, and wet hemlock bark 49% bone dry. This refuse is thereby turned into a good, usable fuel.

Nekoosa Motor & Machine Co.

Paper Mill Machinery, Iron, Brass and Sulphite Bronze Castings

NEKOOSA, WISCONSIN

lacs, varnishes and other substances were tried, with little success. Under the method now in use the operator wets a glass or steel-covered table, lays down a sheet of tissue; with the pasting machine, rice paste is put on, then in turn the newspaper page, paste and tissue, when the page is dried and pressed under a gas-heated mangle.

Safety Week in New York City

Safety Week in New York City has been planned for the week of October 8th to 14th and Henry D. Sayer, Commissioner of the New York State Department of Labor, has been appointed chairman of the Industrial Committee for that period.

More than six thousand industrial plants in New York City will participate in this campaign and all manufacturers are urged to conduct a safety campaign within their own plants in order to most effectively reach the greatest number of workers.

The International Paper Company of Albany, New York, estimates that development of the power reservoirs of the upper Hudson would result in a reduction of seventy per cent in power costs in Albany and its vicinity, in addition to insuring a regulated and steady flow throughout the year and affording a saving of thousands of dollars to paper mills operating there. It is estimated that 632,000 horse power can be developed at an approximate cost of from twenty to thirty dollars a year per horse power. At present the average horse power production ranges from eighty to one hundred dollars. The saving afforded would include a saving of twenty thousand tons yearly in anthracite coal.

New England

Boston, October 1, 1922.

Coal has, of course, been relegated to a position of lesser importance this month by the heavy receipts of British coal at Boston and Portland and by the improved movement of both Pennsylvania and West Virginia coals to New England. Prices of all coals are still on an uncomfortably high plane and it has been found necessary therefore to revise finished paper prices in an upwardly direction including all classes from board to all rag writings. Andrew P. Lane, the fuel administrator of Maine, stated the situation for his state in a manner which may apply to all New England when he said that there is no need for any industry being without coal.

In the price revisions effected by New England mills, the one of most general importance is the advance to 6¾c by Brown & Co., on kraft paper, bringing their price to a parity with that of other New England mills. Regarding kraft paper another feature of the month was the prosecution instituted by Customs officials of certain converters in Boston, and, we understand, in New York also, who have been importing kraft paper at false valuations. It has been more or less of a mystery to mill men where this cheap wrapping originated, and in view of the foregoing much of its cheapness is now explained.

Fall Meeting Northeastern Division American Paper and Pulp Mill Superintendents' Association

The last meeting of the Northeastern Division of the American Pulp and Paper Mill Superintendents' Association was held at Lincoln, New Hampshire, Saturday, October 7, 1922, at the Lincoln Hotel. The program and entertainment committees consisting of Louis La Duke and J. S. Schumacker of the Parker-Young Co., at Lincoln prepared a program that was especially attractive and interesting to every member. The Barker-Young Company at Lincoln, manufacturing bond Manila, sulphite pulp, etc., invited the Association to visit their mill, which in itself was worth the trip.

The papers presented at this meeting made it exceptionally worth while. Mr. Walter S. Haley presented a paper on the Seasonal Influences in Sulphite Manufacturing. Most sulphite mill superintendents find these seasonable influences among their many problems and a paper by a man who has very largely if not entirely overcome these problems proved timely as well as interesting. Mr. K. E. Terry, of the S. D. Warren Co., read a paper on Belting in the Pulp and Paper Industry, drawing his conclusions from what is perhaps the most complete service record on belting in almost all of the departments of the paper industry, consisting of work in ten miles of belting under many varied conditions of operations with years of very complete record made for authoritative information.

The extent to which English china clay is consumed by Maine book paper mills is illustrated to some slight extent by

Increased handling capacity at one-half the cost

To double your handling capacity and at the same time cut the unit cost in half is certainly worth while. The Brownhoist locomotive crane shown above is doing this at the paper mills where it is working. This crane handles 85 thousand feet of timber per day at a cost of 70 cents per thousand. This is against 45 thousand feet at a cost of $1.48 per thousand under the former method.

In addition to the speed and low cost of upkeep of Brownhoist cranes their great flexibility should be considered. Practically all kinds of materials can be handled anywhere as Brownhoists are made to operate on traction wheels or creeper trucks as well as railroad trucks. And the saving of handling materials by locomotive crane is usually as great or greater than the above.

Catalog K shows many types of Brownhoist cranes working in different industries. If you have any handling problems you will be interested in seeing how some Brownhoist owners are solving theirs. Write us. The knowledge of 40 years of crane building is at your service.

The Brown Hoisting Machinery Co.
Cleveland, Ohio

Branch Offices, New York, Pittsburgh, Chicago, San Francisco and New Orleans

BROWNHOIST

KALAMAZOO TANKS

Any Size or Shape

Blow Pits
Acid Storage Tanks
Vats, Etc.

We are especially well equipped to handle large tanks, having a good many years' experience in paper mill requirements.

Ask for catalog. Send us size required and specifications. We will make blue prints for same if desired.

KALAMAZOO TANK & SILO CO.
KALAMAZOO, MICHIGAN

Making Habit Pay the Piper

Bad Habit has to pay for his extravagance when economy gets a call from Business.

These days business has to work, and Economy has again become his right-hand man.

Horton Tanks are scientifically designed and built in the most modern manner with particular attention to *economy*.

They therefore meet fu lly today's demand for the maximum serviceability at the minimum safe cost.

Plans, Specifications and Estimates Furnished on Any Tank without Obligating You

112

CHICAGO BRIDGE AND IRON WORKS
NEW YORK, 3150 Hudson Terminal
CHICAGO, 2445 Transportation Building
MONTREAL, 1133 Bank of Toronto Building

HORTON TANKS
DIGESTERS, BARKING DRUMS and STACKS

WOODEN TANKS

Wood Tanks Last Longest

Wood tanks not only last longer than steel tanks for use in Paper and Pulp Mills, but give better service. Wooden tanks, such as we manufacture, will out-live the man ordering the tank.

Our Slogan—"Satisfied Customers Only"

Write today for information that should be in your possession. This is a part of our Co-operative Service.

Pittsburgh Office
408 BAKEWELL BLDG.

THE HAUSER-STANDER TANK CO.
CINCINNATI, O
U.S.A.

STEEL STACKS

BREECHINGS
STEEL TANKS OF ALL KINDS

Fabricators and Erectors of Sheet and Plate Steel Work

Littleford construction assures you of highest quality material and workmanship. Complete erection facilities enable us to erect all kinds of work anywhere. Send us your specifications or blue prints for quotations.

LITTLEFORD BROS.
500 E. Pearl Street
CINCINNATI, OHIO

arrivals from January 1 to the middle of September as listed by the Chamber of Commerce at Portland. During that time 50,854 tons of clay were entered there. Inasmuch as English clay is admittedly superior for coating purposes this might not appear so surprising, but the fact that 67,191 bales of wood pulp arrived at Portland during the same period and almost as much at Boston indicates the extent to which New England mills are becoming dependent on foreign pulp. Of course, some of the pulp entered at Portland moves to Michigan, Wisconsin and other western mills over the Canadian railroads which have terminals at Portland and which offer a differential under the rates on American roads from Boston.

Safety Campaign in Bird & Son's Plant

Bird & Son of East Walpole, Mass., and Phillipsdale, R. I., are stimulating interest in their safety campaign by publishing in the house organ, "The Neponset Review" a summary of accidents which take place throughout the company plants. These are listed in tabular form for each mill department, including the box shops, power and maintenance, floor covering, main mill, and building and roofing, and beside each is given the number of employes, accidents during the previous month, the total days lost in each, and from these facts percentages are computed, the safety committee working continually to create competition in each department to stand highest in these safety percentages. It has been Bird & Son's experience that most accidents are not caused by machinery, for during August and September the 22 accidents in or about the mills were of a nature to denote carelessness as the cause, and were accidents which no mechanical safety devices could prevent, such as stepping on nails, fingers and feet jammed under bales of paper, etc. The mill's efficient safety committee however through the widely read "Neponset Review" is making headway in reducing accidents resulting from carelessness to the zero mark.

Predict Cut in Eastern All-Rail Rates

Tuesday, October 3rd, representatives of the New England Paper and Pulp Traffic Association appeared at a hearing in the rooms of the New England Freight Association in the South Station in Boston, where the Eastern Steamship Company put forward a proposition to establish a through freight rate from interior Maine points to New York City which would be 1c per hundred pounds under the all-rail rates. The present steamship service between Portland or New York exists only at the grace of the Maine paper manufacturers. Without paper traffic the steamship company has frankly admitted the line unprofitable. But to get paper moved over its lines the New England paper and pulp Traffic Association has contended for substantial differentials which would make worth while the disadvantages of an extra handling of paper at Portland. At the hearing the Traffic Association declared the differential far too small to attract enough of their business and pointed out that a heavy paper traffic at lower differentials would undoubtedly prove profitable, whereas a light movement at higher rates would hardly pay the line's expenses. A wider gap in the all-rail and rail-and-water rates is confidently predicted by the paper men.

W. D. Gregor to Manage Newton Falls Company

W. D. Gregor, formerly general superintendent of the mills of the Remington Paper company at Norfolk, Norwood and Raymondville, St. Lawrence county, has just been appointed general manager of the Newton Falls Paper Company. Since being taken over by the McGraw-Hill corporation and the United Publishers' corporation of New York, the Newton Falls company has been devoted to the manufacture of book paper and bond paper.

Mr. Gregor has been in the paper business since 1904, when he started with the Oxford Paper company of New York, which has a large plant at Rumford, Maine. From there he went to the new plant of the Price Brothers at Kenogami, Quebec, Canada. He has made a specialty of handling plant changes, and in that line has been connected with the Peerless mill at Dayton, Ohio, the Arrowhead company of Oswego, and the Bayliss Manufacturing company of Austin, Pa.

Attempt to Eliminate Differentials on Foreign and Domestic Trade

At the differential rate hearing before the Chief Examiner of the Interstate Commerce Commission which started Tuesday, October 3rd, at Boston, Boston and New England generally, is trying to eliminate the differentials which Baltimore and Philadelphia enjoy on foreign and domestic freight to and from "differential" territory in the middle west. Importers of wood pulp in New England, as well as china clay importers, are interested because if the differential is abolished

Coe Roller Dryers

for Drying Wall Board, Plaster Board *and* Other Flat Products

We maintain an Experimental Dryer in our plant and on this we can test out gratis, samples of your product, under different conditions. This gives you accurate data as to its drying and we can build you a machine to duplicate these results.

The COE MFG. CO., Painesville, Ohio

The Baby Claflin Refiner

for

Refining Light Stock and Experimental Purposes

The plug is 12 inches outside diameter at the large end. Six inches at the small end and seven inches long. It is equipped with Hyatt Roller Bearings and U. S. Ball Thrust Bearings. Capacity, 300 to 500 pounds per hour.

Inquiries will receive prompt attention

The Claflin Engineering Co., Lancaster, Ohio

Rebuilt Paper Mill Machinery in Stock and Guaranteed

Not Where Is and as Is

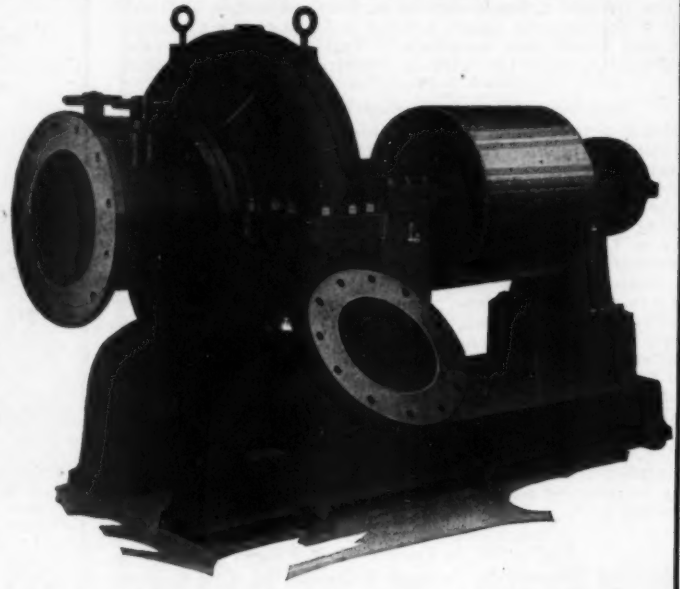
FOURDRINIER TISSUE MACHINE—One 68".
FOURDRINIER PARTS—Pusey & Jones 118", 100". Kutter Trowbridge 96".
PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housing with rolls 18"x117". Black & Clawson swing arm housing.
DRYERS—Four 48"x111", one 36"x80", two 36"x73", four 48"x68", one 84"x67", eleven 42"x66", two 36"x48", four 20"x39".
CHILLED CALENDERS—One 86" six roll, one 82" five roll, one 66" five roll, one 54" five roll, two 58" five roll.
DILLON DOCTOR—For machine calender 60" to 144" face.
SLITTERS & WINDERS—One 120" Warren, one 108" Kidder, one 110" two drum Moore & White.
REELS—Pusey & Jones two drum, Rice, Barton & Fales two drum.
BEATERS—Four N. & W. 72"x42", one Dilts 62"x50" iron tub, one Jones 62"x52", one Dillon 60"x48", two Emerson 54"x60", three Downingtown 54"x42" iron tub, two Emerson 53"x52", seven Horne 36"x36", two No. 2 Claflins, two No. 1 Claflins. One 36"x26" N. & W.
JORDANS—One Appleton Wagg Majestic, two No. 2 Dillon Improved, one Large Horne, two Monarch, one Jones Standard, one Pope brushing engine.
SCREENS—Two 12 plate, two 8 plate, open side Packer screens. Two 6 plate, one Moore & White auxiliary.
STUFF PUMPS—Deane triplex 9"x8", Gould's triplex 8"x10". Sandusky triplex 4"x6", Moore & White duplex 8"x12". One Beloit duplex 6"x14". Two 6" Post.
REVOLVING SHEET CUTTERS—One 82" and 62" Clark, five 61" Hamblets, four 61" Finlays, one 50" Hamblet diagonal, one 42" Finlay.
REAM CUTTERS—One 48" Acme, one 45" Holyoke Seybold.
SUPER CALENDERS—One 52" Holyoke, one 45", one 42", one 36".
WET MACHINES—Four 72" Bagley & Sewall Hydraulic, one 48" Noble & Wood.
One Manistee Hog Chipper.
One Ryther & Pringle Shredder.
We have a large number of pumps and over five hundred calender, press and couch rolls in stock.

Frank H. Davis Company
175 Richdale Avenue, Cambridge, 40, Mass.

You Will Find Every Desirable Feature in These Pumps—Just Check Them Off

1. Upper half casing can be removed for cleaning, inspecting or repairs without breaking gasket or disconnecting pipes.
2. Hand hole covering in filler piece permits cleaning impeller.
3. Casing is mounted directly on base to assure rigidity.
4. Floor space is saved by having discharge 45° up from horizontal.
5. All parts are made extra heavy and of ample proportions to withstand strains and wear.
6. Water cooled stuffing box and thrust bearings.
7. Ring oiled, babbitt lined shaft bearing.
8. Space between pulley and bearings keeps oil off belt.
9. Special open or closed type impellers that won't clog.
10. Suitable for pulley or direct driven at speeds that permit economical motors.

Further details will be supplied by Dept. No. 27



BUFFALO STEAM PUMP COMPANY, Buffalo, N. Y.

"Buffalo"

SPRAY NOZZLES

are best to break up the foam on the wet end of paper machines. The spray is soft and uniform, and nozzles do not clog.

BUFFALO FORGE COMPANY
Buffalo, N. Y.

it will allow an importer of pulp, clay or other foreign paper making material, to bring and land a cargo at Boston for both New England and western mill customers. As it is, he must either unload part of a cargo here and send the ship on to Baltimore or Philadelphia with the remainder of the cargo for his western customers, or else charter two ships.

International Moving Pulpwood from Canada

The steamer Philip T. Dodge of the International Paper Company has alone brought 56,000 cords of pulpwood from eastern Canada to Portland, Maine, this summer. The wood moved to the various International mills over the Maine Central and the Canadian lines. Steamers operating for the Oxford Paper Company between Portland and Cape Breton, N. S., during the season have brought well over 20,000 cords. The Philip T. Dodge will continue her trips into the fall until stopped by ice in the lower St. Lawrence. Despite the big supplies of wood on hand at nearly all New England mills the imports of Canadian wood through Portland, where it is readily tabulated, grows larger each year in proportion to the amount cut in Maine, New Hampshire and Vermont.

The ground-wood mill of the International Paper Company at Montague, Maine, together with a small storehouse and a quantity of pulp wood, were destroyed by fire early in the month causing a loss estimated at $75,000, fully covered by insurance. The fire was supposed to have been caused by a hot box, and the water tank on the roof of the mill being empty there was no available supply for fire fighting. Since the beginning of the strike in May, 1921, the mill had manufactured no pulp, but was being used for rossing pulpwood, of which 20,000 cords were on hand. It employed about 30 men. At this writing the company is undecided whether or not to rebuild.

Mr. S. T. Dana, Maine's capable forest commissioner, states that one Maine pulp and pulpwood company intends setting out between two and two and a half million spruce and fir trees annually. Mr. Dana contends that natural forest reproduction takes place so rapidly in Maine that it is unnecessary as a rule to artificially plant new forests. It is necessary, he continues, in the case of barren or burnt over lands. Moreover the natural growth must be protected against fire and pest and he believes paper mills with their heavy capital investments can well develop a forest policy. He adds that many are doing so in New England.

Experimenting to the end that they might produce book and cover papers of distinction and merit, yet at what might be called popular prices, the Worthy Paper Company, of Mittineague, Mass., has this year brought out two papers which are unusual and have been received with favor throughout the country. The two are Roxburge, an unusually beautiful laid, and Aurelian, the most recent addition, a book paper that gives the impression of hand-made thoroughness. These papers are the product of months of testing and experimenting.

Explosion Causes Loss in Bag and Paper Plant

The plant of the Advance Bag and Paper Company at Howland, Maine, suffered a loss of something less than $10,000 when a diffuser exploded at the plant early in the month. It is thought that extra pressure may have been the cause. No employees were injured, as none were present at the time. The sulphate department was closed for several days though the remainder of the mill suffered no lost time.

While pulpwood operators estimate that the saw log cut of northern New England will be small this winter, they are unanimous in stating that the pulpwood drives next spring will be about normal, greatly in excess of the less than 50 per cent cut of last winter. It is estimated that the cut of spruce and fir will be close to one billion feet of which about two-thirds will be pulpwood.

The business of the American Writing Paper Company is increasing to very satisfactory proportions. The company's plants are running to better than 85 per cent of capacity. Despite the very bad year of 1921 the Company has been able to spend money on improvements this year and following the first five months of the year a profit was shown above all expenses.

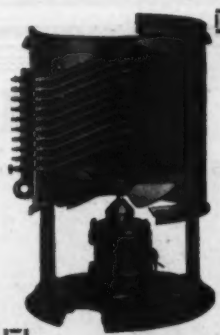
About 45 heads of Departments of the S. D. Warren Company were guests of the Warren Association at Poland Spring, Maine, during September.

Judging by prices quoted the imposition of $1.25 additional duty on foreign clay has been more or less absorbed by the pro-

Stickle Compound Condensing System
and Automatic Steam Control
for Paper Machines

As shown in the folder we sent out to the mills—"*How to Dry Paper*"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you. We guarantee a saving of 20 per cent in steam consumed for this purpose.

Open Coil Heater & Purifier Company
Indianapolis Indiana
Boston Philadelphia



Uniform Heating

is accomplished by removing the cold air from the floor line and replacing it by the warmer air that naturally tends to go towards the ceiling.

***Bayley* B.T.U.**

distributes heat evenly by means of an electrically-driven fan, installed under a series of tempering coils. The fan forces air through the coils and keeps up a constant circulation of tempered air throughout the room. It is made of iron and steel throughout, requires no distribution ducts; no holes through fire walls or partitions, can be installed anywhere by simply setting on the floor and connecting steam and return piping and wiring to motor. Easily moved from one location to another.

Send for B. T. U. Bulletin today

Bayley Manufacturing Company
Dept. B, 732 Greenbush St., Milwaukee, Wis.

ALLIS-CHALMERS

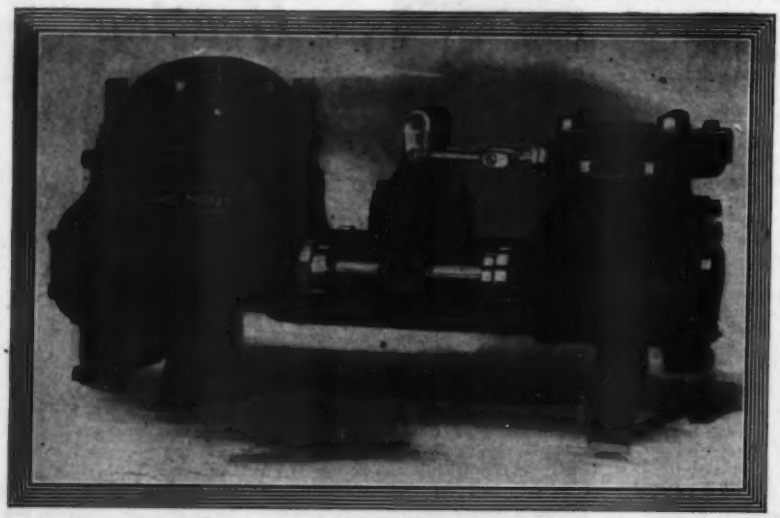
CENTRIFUGAL PUMPS

Extract from a customer's letter:

"We have in the past used pumps of many different makes and types, but have never before had the very great satisfaction of having an installation that has proven *so thoroughly* reliable and free from annoyances."

ALLIS-CHALMERS, MILWAUKEE

FAIRBANKS-MORSE PUMPS



Use this Proven Pump for Boiler Feeding and General Service

This duplex piston pattern steam pump is suitable for boiler feeding and similar service where pressure does not exceed 150 pounds.

Fairbanks-Morse pumps have proven their dependability and economy in every industry under the most severe conditions.

Our competent engineers, equiped by long experience and practical knowledge, will gladly help you work out your pumping problems.

Fairbanks, Morse & Co.

MANUFACTURERS CHICAGO

THE CANADIAN FAIRBANKS-MORSE CO., LTD., MONTREAL

Oil Engines - Pumps - Electric Motors and Generators - Fairbanks Scales - Railway Appliances - Farm Power Machinery

ducers, for quotations on the basis of the $2.50 tariff continue to be about $13 to $19 c. i. f. and duty Atlantic ports. These figures were recently quoted to New England mills.

The new moulding pits in the plant of the Watson Frye Co., Ltd., of Bath, Maine, are about completed. These well known paper mill machinery manufacturers have had extensive orders from western mills this year and their general business has been so good as to call for a larger force of workers.

A wage increase of about three cents per hour has been granted to 2,000 employes of the S. D. Warren Company at Westbrook, Maine. The company is running full time operations after more than a year of five day week and less schedules.

Cotton waste dealers are making some progress in selling cotton mill sweeps to the roofing mills, inasmuch as the prices of roofing rags have advanced so radically. Boston dealers are quoting 1.50c per pound f. o. b. New England mill points.

Incidental to the opening up of new pulp wood lands in the Moosehead Lake country of Maine, the Great Northern Paper Company has built many good roads. It has advertised in Boston recently for laborers to be employed in this work.

Black River Valley

Watertown, N. Y., October 1.

H. D. Eliason, for the last three years treasurer and general manager of the Newton Falls Paper company of Newton Falls, makers of book paper, has left for Hopewell, Virginia, where he assumes the position of vice-president and general manager of the Hummell-Ross Fibre corporation. This concern has a new mill with a capacity of 100 tons of pulp daily.

The retiring manager is widely known in the paper industry, being a member of the Light, Heat and Power Committee of the Technical Association of the American Book Paper Manufacturers' Association. Before coming to the Newton Falls company he was with the E. I. DuPont de Nemours company; the Keasby & Mattison company's mills at Ambler, Pa.; the S. D. Warren company of Milford, N. J., and was also with the Hammermill Paper Company, as an engineer and assistant superintendent.

Aldrich Paper Company Sells Holdings to Oswegatchie Paper Co.

The Oswegatchie Paper company, the directorate of which is composed almost entirely of Watertown men, has filed papers of incorporation with the secretary of state at Albany. The capitalization is placed at $200,000, and the company will begin business on a paid-up capitalization of $100,000. The directors are Edward B. Sterling, owning 300 shares of stock; Samuel B. Wardwell, with 350 shares; and Addison F. Wardwell, with 350 shares. John A. Remington, formerly of Watertown, and the son of a veteran paper maker, the late Charles H. Remington, will be superintendent of the new mill and was made a director of the company at the organization meeting in Watertown.

The company was formed to purchase the holdings of the Aldrich Paper company of Governeur, and its officers are all connected with the West End Paper Company of Carthage. Purchase includes the site of the burned paper mill at Natural Dam, the present pulp mill at that place and a pulp mill at Emeryville, the 2,500 horse power power site at Natural Dam, the Emeryville water power and 30,000 acres of timber land in the Adirondacks.

A modern paper mill with a capacity of 50 tons a day of newsprint will be built at Natural Dam, officers of the company have announced building operations will be started at once, and the mill will be ready for paper making by the first of next April. The main building, containing the machine room, will be of brick and steel, 260x75 feet. A 164 inch Fourdrinier machine, turning out 700 feet of newsprint a minute, will be installed.

Other buildings planned include a finishing room, shipping room and boiler room. The sulphite mill, which was burned in the same fire that destroyed the old Aldrich company mill in 1920, will not be re-built for the present. The ground wood mill, now partly in operation, will be used as will a ground wood mill at Emeryville.

Paper Man Invents New Grinder

John J. Warren, president of the Harmon Paper company at Brownville, the Warren Parchment company at Dexter, of the Lincoln Mills, Ltd., of Merritton, Ont., and a vice-president of the St. Regis Paper company, has put into successful operation a new magazine grinder which is claimed by paper experts

Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

We also manufacture—

SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

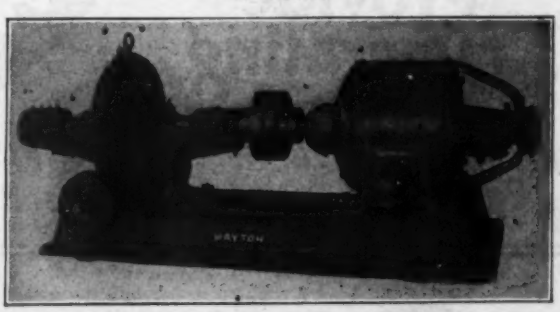
Port Huron, Mich. Petrolea, Canada

Every ball bears our registered trade-mark

Hayton Centrifugal Pumps

SAVE POWER and MONEY

BY USING



HAYTON CENTRIFUGAL PUMPS

"With us it is an engineering problem"

Designed especially to meet the requirements of pulp and paper mills. We do not build a pump after OUR ideas and then try to sell it to you. We make a study of YOUR peculiar problems, and then build a pump to suit your needs. Hayton Pumps are built for hard, continuous operation, and will stand up under the most severe usage. We guarantee the highest efficiency, and maximum economy in power consumption.

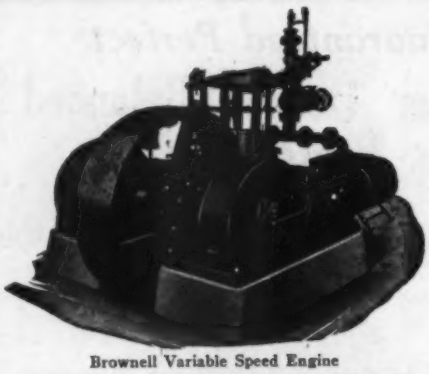
We also build a full line of Sandusky Triplex pumps.

Let us have your specifications for quotations

Hayton Pump & Blower Co.

Manufacturers

APPLETON, WISCONSIN



Brownell Variable Speed Engine

BROWNELL

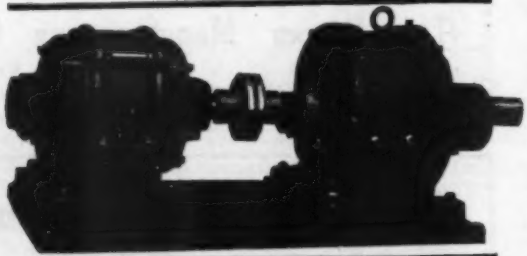
Conservative changes in the design of Brownell Variable Speed Engines which are made from time to time always improve the consistently good performance of the engine, make for higher efficiency and added safety.

Each one of these three important features has been given special attention. The Pump and Filter Continuous Oiling System, the special Cut-off Valve and Gear, and the Patented Safety Stop are features of the Brownell engine of which you should know.

THE BROWNELL COMPANY Dayton, Ohio, U. S. A.
Established 1855

ENGINES

James Speed-Reducing Transmissions



James Transmissions eliminate complicated and open Gearing, Shafting, Belts and Pulleys, not to mention the great losses thru friction.

Send for Bulletin descriptive of our Speed Reducing Transmissions.

Manufacturers of cut Gears of every description.

D. O. James Mfg. Company
1114 W. Monroe St.,
Chicago, Ill.

Provide Operating Economy

A complete line of

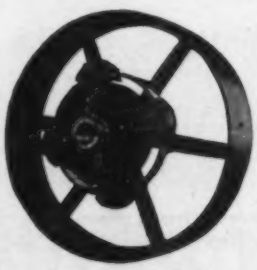
Power Transmission Machinery

FOR

BELT AND ROPE DRIVES

MANUFACTURED BY

THE FALLS CLUTCH & MACHINERY COMPANY



FALLS SOLID
FRICTION CLUTCH PULLEY

NEW YORK
298-298 Fulton Street

Cuyahoga Falls, Ohio

BOSTON
52 Purchase Street

Catalogues upon request

to be one of the most advanced in grinding processes. The machine is now in use at the ground wood mill of the St. Regis company at Deferist, N. Y., and will be extensively marketed by Mr. Warren, who is also the inventor of the Warren winder, widely used in paper mills.

The Warren grinder has these advantages over the old hydraulic type, it is said; automatic control of the feed of wood into the magazine, assuring a practically uniform length of fibre; increase in production of ground wood at a lessened labor cost; less power consumption per ton of pulp; decrease in the stone cost per ton of pulp; and accurate determination of the grinder's production during any period.

The grinder can handle four foot wood, split wood and saw mill slabs. After the wood is placed in the magazine of the grinder, it is seized by four heavy chains of the thimble roller type, compacted and forced down against the grinding element. The machine can be easily adjusted to allow for variations in the size of the grindstone, with the idea of keeping at all times the finger plates of the magazine as close to the grinding element as possible.

The strictly novel features of the grinder are baffles, which form part of the magazine and which are operated within close limits between the housing and the magazine, to center the magazine over the grindstone and to prevent the escape of steam generated by the grinding. This steam is useful in softening the wood being ground. The steam also strikes water coming from a spray placed at the top of the magazine where the wood enters, sending down only hot water onto the grindstone, thus adding to its life.

Burring the stone is accomplished by a hydraulically operated stone trueing lathe extending through the sides of the grinder, the carriage of which can be run inside the housing when it is desired to dress the stone. Between 40 and 45 horse power per ton of dry air pulp is the best amount for newsprint pulp production.

Protest Against Increased Assessment

Paper mill owners of Watertown and the officials of the Bagley & Sewall company are among manufacturers who have joined in protest against the increased assessments on their properties for 1923. Industries in Watertown generally have been assessed from 25 to 75 per cent more this year than last, and as a result the manufacturers have united, in a committee appointed by the president of the chamber of commerce, in an effort to secure reductions. They maintain that they cannot compete with firms in other cities, where a lower tax is in force.

Included on this committee are G. S. Knowlton, treasurer of Knowlton Brothers, makers of book and fine paper; and C. W. Valentine, vice-president of the Bagley & Sewall company.

Kalamazoo Valley

Kalamazoo, Mich., October, 1922.

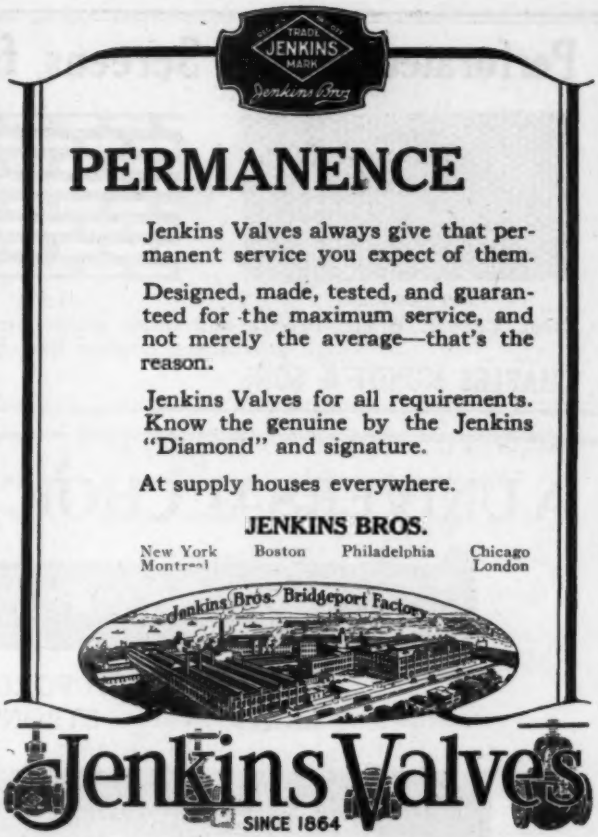
The Kalamazoo Vegetable Parchment Company has picked Mr. Edward S. Gilfillan to carry out a most elaborate plan of social welfare work. Mr. Gilfillan comes to the Parchment Company from Portsmouth, Ohio, where he has been actively engaged in social betterment work for the community. To appreciate the task now before him it must be mentioned that Parchment is more than a paper mill. It is a community of well built, modern homes with seventy-five now under construction.

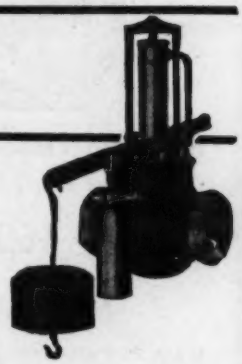
The activities of this community center about the Parchment Community House. Here it is that once a week the children and grown-ups gather for Sunday School. In the basement of this building is a thoroughly modern cafeteria where every noon hundreds of mill workers enjoy a warm meal in place of their cold lunch. In this same spacious basement is also a grocery store. During the week this community house features high class motion pictures, banquets and a variety of community gatherings.

The rapid development of the Kalamazoo Vegetable Parchment Company and community demands the services of a man of personality and vision as well as executive ability. Mr. Gilfillan is already at work on plans developed by himself and Mr. Jacob Kindleberger of the company.

Bryant Paper Company Authorizes New Bond Issue

At a meeting held September 26, the stockholders of the Bryant Paper Company authorized the issuance of $5,000,000 in bonds by that corporation. The purpose of this huge bond issue is to put through an immense program of improvements. This program, which will be started at once, is the result of a survey made of the Bryant Paper Company's properties by V. D. Simons of Chicago and his corps of assistants. This survey, the preparation of which has required a year's time,


TRADE
JENKINS
MARK
Jenkins Bros.
PERMANENCE
Jenkins Valves always give that permanent service you expect of them.
Designed, made, tested, and guaranteed for the maximum service, and not merely the average—that's the reason.
Jenkins Valves for all requirements. Know the genuine by the Jenkins "Diamond" and signature.
At supply houses everywhere.
JENKINS BROS.
New York Boston Philadelphia Chicago
Montreal London
Jenkins Bros. Bridgeport Factory
Jenkins Valves
SINCE 1864



Lasts longer
—serves better

—BECAUSE it has no diaphragms or springs to fail and cause trouble—

—BECAUSE years of experience have shown how to build in staying qualities—

—BECAUSE it operates on the infallible principle of the simple balanced scale—

Davis Regulators, like all other time-tested Davis Valve Specialties, give a remarkably better service over an extraordinary long period.

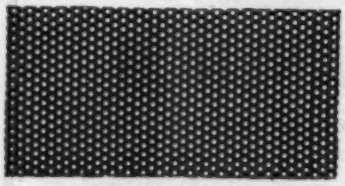
Write the G. M. Davis Regulator Co., 414 Milwaukee Av., Chicago, for information about the regulator and other Davis Valve Specialties.

The complete line includes Back Pressure Valves, Float Valves, Relief Valves, Stop and Check Valves, Steam Traps, Pump Governors and many other standard—but better—specialties.

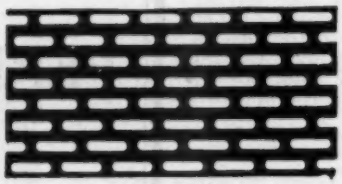
Ask for description of the complete line of Davis Valve Specialties

DAVIS VALVE SPECIALTIES
STEAM SAVERS SINCE 1875

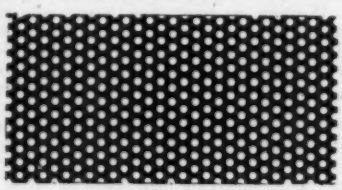
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



⅛ x ½" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

A UNIVERSAL CHOICE *for* PAPER MILLS

EQUIPPED WITH FORGED STEEL FLANGES
LIGHT STRONG DURABLE

Steel fittings made for your individual requirements. Valves for pulp lines in stock at all times.

Production Book "A" Sent Upon Request

Our engineering department will help you solve your piping requirements

AMERICAN SPIRAL PIPE WORKS

MAIN OFFICE AND WORKS
P. O. BOX 485, CHICAGO

NEW YORK OFFICE
50 CHURCH STREET

WYCKOFF WOOD PIPE

PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.

The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.

The Pipe of Service

DURABLE—ECONOMICAL—EASY TO INSTALL

Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with steel bands whose tensile strength is 58,000 to 65,000 lbs. per square inch. The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.

Write today for catalog and prices

A. Wyckoff & Son Company

1855 Elmira, N. Y., U. S. A. 1920

is complete in every detail. Mr. Simons is to have charge of all engineering details in the execution of this vast program.

The first division of which—program "A"—calls for the following improvements: (1) The replacement of four of their present boiler rooms in which there are 24 boilers, by one central power plant in which there will be only 4 boilers. (2) Complete remodelling of their Superior division with the purpose of increasing production and reducing costs. (3) The construction of a central machine shop and supply department which will also include a salvage plant for the purpose of reclaiming and repairing equipment. This work, starting with the new power plant, is to be commenced at once and will cost $1,500,000.

As soon as the judgment of Mr. Simons in regard to the economies and earnings of these improvements has been vindicated program "B" will be taken up. This second program is to include improvements in the Bryant, Imperial and Milham divisions and calls for the expenditure of about $2,000,000. The completion of these two programs will give the Bryant Paper Company a thoroughly modern plant at a cost far less than if they were to build new mills. These improvements, it is estimated, will increase the production of their plant approximately 50 per cent. Mr. Simons is already establishing an organization in Kalamazoo, preparatory to the work.

Michigan Division of Superintendents' Association Meet

The annual meeting of the Michigan Division of the American Pulp & Paper Mill superintendents' association was held at the Park American Hotel, Thursday evening, September 21. All officers of this organization were re-elected. The line-up is as follows: Chairman, N. M. Brisbois, Southerland Paper Co.; first vice-chairman, Edward H. Gilman, Bryant Paper Co., second vice-chairman, Michael Redmond, Kalamazoo Paper Co., third vice-chairman, C. W. Ullrich, Wolverine Paper Co., Otsego; secretary. George Pountain, Allied Paper Mills. The following committee whose duty it will be to assist the chairman in the preparation of plans for the year's activities was appointed: Clarence Harter, Rex Paper Co.; Frank A. Johnson, Allied Paper Mills; Jacob Parent, Western Board and Paper Co.

One suggestion which met with considerable favor at this meeting was that of a proposed question box. The members of the organization plan this method of gaining some genuine constructive help from their meetings. Edward T. A. Coughlin, who attended the meeting of the executive board of the American Pulp & Paper Mill superintendents held in Chicago, September 17th, discussed the plans being worked out by the national association Michigan division members are planning to attend the session of the Technical Division which is to be held in Detroit, October 9th and 10th.

Executive Board of Superintendents Meet in Chicago

At the meeting of the executive board of the American Pulp & Paper Mill Superintendents, held in Chicago, Sunday, September 17, the following plans were adopted: A division of board mill superintendents with headquarters in Chicago will be formed. This division will include mills in Illinois, Indiana and Iowa and will be known as the Chicago division. A Pennsylvania division is also to be formed. This will be in charge of John A. Bowers, Hammermill Paper Company, Erie, Pa.

The mills at Niagara Falls and Buffalo have been transferred to membership in the Canadian division, of which division there have been two sections made, the Eastern division at Montreal and the Western division at Toronto. It is also planned to form a division at Holyoke, Mass., including mills in Massachusetts, Vermont and Connecticut.

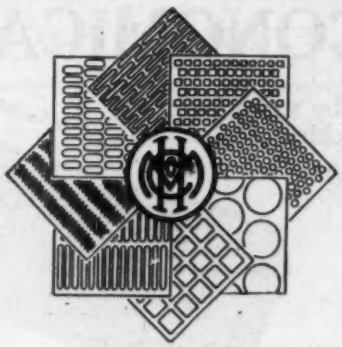
The coal situation in the Kalamazoo Valley has ceased to be a problem. Coal is now available in sufficient quantities and at a reasonable price.

Miami Valley

Dayton, October 1, 1922.

The Colin-Gardiner Paper Company of Hamilton, Ohio, having secured the exclusive rights to the K-B waterproofing process of the Flintkote Company of Boston, Mass., have let contracts for a new $200,000 building to be erected directly adjoining their present plant in Hamilton.

The Flintkote Company has perfected a process of waterproofing whereby two or three operations are combined in one. Asphalt, in various forms, has proved to be the most satisfactory waterproofing medium for paper, but owing to its adhesive qualities it has always seemed necessary, in the past, to make two separate sheets of paper and then combine these plies with asphalt. By a patented process of emulsifying asphalt by means of a highly colloidal clay so that the asphalt



Perforated Metal Screens

in all metals for pulp and paper mills

Elevator Buckets (Plain and Perforated)

Conveyor Flights and Trough

General Sheet and Light Structural Work

Light and Heavy Steel Plate Construction

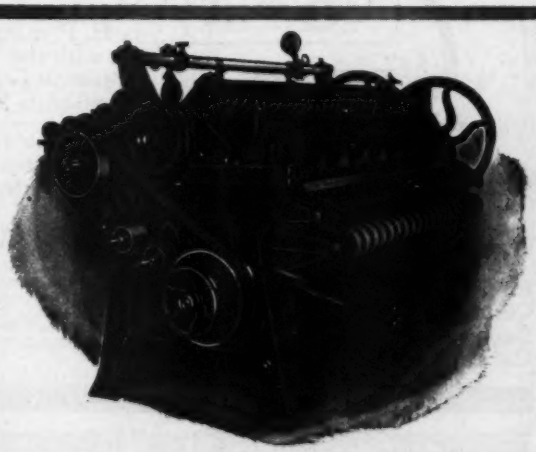
Write for perforated metal handbook

Hendrick Mfg. Company

Main Office & Works
51 Dundaff Street
Carbondale, Penna.

30 Church Street
New York City

544 Union Arcade Building
Pittsburgh, Penna.



PAPER CUTTERS

Single, Duplex, and Diagonal

CUTTER KNIVES

PATENT TOP SLITTERS

Hamblet Machine Co.

LAWRENCE, MASS.

ECONOMICAL!

Order by name from your jobber

For General Use on Paper Mill Machinery

Manufactured by

The Paul R. Brown Company

97-101 Warren St. New York City

Full Fuse Protection

On SMALL POWER MOTORS Get the TIME LIMIT and FULL FUSE PROTECTION for Practically the Same Cost You are Paying for Ordinary Fuse Plugs

With the addition to your present plug fuse blocks of "Federal Three-Thirty" fuse case which will outlast your fuse block. This case contains the Federal Time Limit Cartridge Fuse and the Time Limit Cartridge Fuse is renewed at about the same price as ordinary fuse plugs.

Most insurance regulating bodies and city electrical codes state that on ¼ H. P. motors fuses of *not larger* than 10 amp. capacity must be used, yet with the ordinary fuse plug which does not have time element feature, it is necessary to fuse up to 30 amp. in order to take care of the starting load, thereby killing all protection to your motor.

This same motor is fully protected with 10 amp. Federal Three-Thirty Limit Fuse Plug, the time limit feature taking care of the starting load.

Other sizes of motors and apparatus can be similarly protected.

List Price, Complete with Renewable Fuse Cartridge, **50c**

FEDERAL ELECTRIC COMPANY

Also Manufacturers of Federal-National Multiphase Time-Limit Renewable Fuses

8700 South State Street - - CHICAGO

130 West 42nd Street NEW YORK CITY

91 New Montgomery Street SAN FRANCISCO, CAL.

BRANCHES IN ALL LARGE CITIES

TIME-LIMIT RENEWABLE FUSE CARTRIDGE

WE-FU-GO AND SCAIFE WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

is broken up into minute particles on which the clay forms a protective insulation and then later subjecting the paper coated with this emulsified asphalt to sufficient heat by means of driers so that the coating is broken down and the asphalt coalesced into its normal state, these operations are combined into one.

Machinery for this process will be installed in the new Gardiner-Harvey mill, the company being the first to install the new system and manufacture the single process paper.

Canada

Montreal, Que., October 1, 1922.

Mr. W. Gorman, manager of the Provincial Paper Mills of Montreal, has just returned from a three months' visit to England. His observations in England lead him to the conclusion that the British paper industry as a whole is not in a satisfactory condition. In addition, the British export trade far exceeds domestic demand, apparently, due to the fact that large quantities of European paper is imported at prices which the British mills cannot touch. Mr. Gorman has some doubts, however, as to the profits for British manufacturers in the export trade. The mills there, in the face of adverse conditions, with output limited and handicapped by trade conditions, are maintaining the quality of their papers. The labor problem seems to be the gravest difficulty to be solved at the present moment.

Belgo-Canadian Corporation Reorganizes

The Belgo-Canadian Pulp & Paper Company, formerly a Belgian corporation, has re-organized under the name of the Belgo Paper Company as a Canadian company, with an authorized capital of $20,000,000. The former stock was replaced by par value common stock of the new corporation, and the new bonds, it is understood, have already been underwritten locally.

The new vice-president and general manager is H. Biermans of Shawinigan Falls, while Adolphe Stochet of Brussels is president. The present output of the mills, it is said, will be increased approximately 300 tons daily.

Construction of a new mill at Bathurst, N. B., with an initial capacity of 100 tons a day and to employ upwards of 1,500 men, will be commenced shortly by the Bathurst Company, Ltd., at Bathurst, New Brunswick. This mill will be for the construction of newsprint only. This, despite the fact that sulphite pulp has advanced $10 a ton in Canada, and that other grades are expected to advance in sympathy. High grade sulphite pulp is now quoted at $100 and $105 f.o.b. pulp mills.

The International Paper Company, which has just come through a period of depression and low prices, is again running at full production and has installed a new machine in their plant at Three Rivers, Quebec. The new machine is being installed by the Bagley & Sewall Company of Watertown, N. Y.

Mr. J. L. McNicol, of Canada, has been engaged by the Siam Government to inaugurate the paper making industry in that country. He reports that, while considerable progress has been made with the mill now under construction, it will be another six months before paper will be made there.

The St. Lawrence Paper Mill plant which is being built at Three Rivers expect to run their first machine by the first of February.

Foreign Correspondence

Dresden, October 1, 1922.

The Society for the German Paper Industry held its regular annual fortieth conference some weeks ago in Bavaria. Last year there was no meeting as conditions were utterly unfavorable, but for the coming years the meetings will, it is hoped, take place. The society has been placed somewhat in the background by the founding of the War Committee for the paper trade, and the League of German Societies for the Printing Trade, but has still to fulfill many important functions. A special committee was formed to remove causes of friction between the paper manufacturers and the manufacturers of paper articles and there was thorough discussion of the present state of the industry as related to past causes. The present scarcity in paper, in Germany, is the result of the action of consumers, who went into the market last winter and bought recklessly, fearing a considerable rise in price, which, as a consequence, actually took place.

Newsprint Exports Decrease

This condition has been somewhat alleviated by an increase

BACK TO NORMALCY

Owing to substantial reductions in the cost of all materials entering into the construction of Jenssen Acid Towers, we are now building them at

NORMAL PRICES

Will YOU let us show YOU how to make MONEY by making a

BETTER ACID

Don't forget that every second sulphite mill on this continent is using our towers, so ask your neighbor what HE thinks of them.

G. D. JENSSEN CO.
200 5TH AVE. NEW YORK, N. Y.

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

Hungerford & Terry, Inc.
CLAYTON, N. J.

The Noble & Wood Machine Co

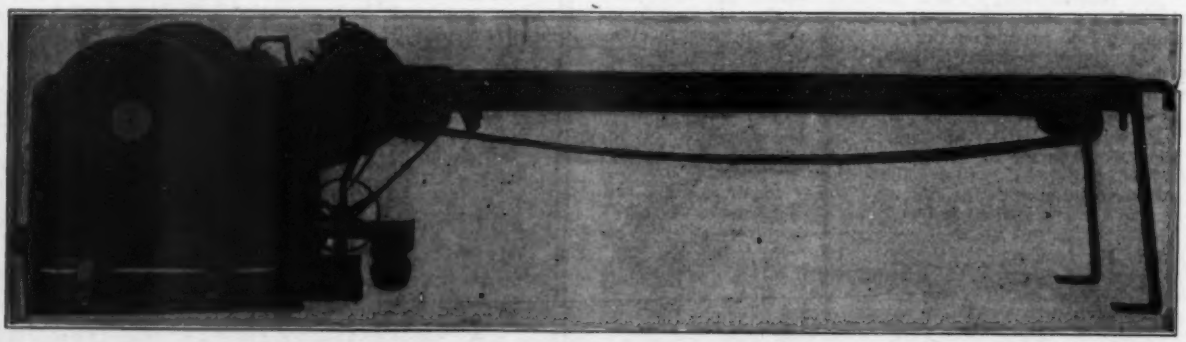
Hoosick Falls, New York

LOOKING for an efficient process for treating your old paper stock?

Write for our Paper Pulping Engine Bulletin

Paper Mill Machinery

No. 11 "GIANT" PAPER STOCK CUTTER



Capacity 2½ Tons Per Hour
Especially Adapted for Handling Waste Paper, Magazines, Etc., Before Feeding to the Beaters

Whatever You Cut, A GIANT Will Solve Your Problem

LET US FIGURE IT OUT FOR YOU

TAYLOR, STILES & COMPANY, Riegelsville, N. J., U.S.A

WATEROUS ENGINE WORKS
Brantford, Ont., Canada
Canadian Representatives

R. J. MARX
133 Finsbury Pavement, London E. C.
Sole Agents for Europe

in paper production of sixty per cent this year as compared with a corresponding period in 1921, while lately the petitions for export licenses have decreased, and so far have scarcely reached the contingents allowed by the government for export.

As regards cardboard, etc., the conditions are still worse. The quantities for export in this division make up not more than one-fifth of the total production. It was resolved to make an effort to import Finnish and Dutch cardboard as demand arises.

During the past few months conditions in the industry have been bad, the mills occupied chiefly with old orders, with new orders coming in in meagre numbers. As a result of high inland prices and the uncertainty of the government loans, the mills demand long delivery periods and do not bind themselves to prices at all. The export has visibly decreased as the world prices have been reached, partly even overcome. Therefore there is some indignation expressed about the government's resolution to levy a special tax upon all exported paper goods to assist the "suffering newspapers." Apart from the fact that the other industries requiring paper suffer just as much as the press, it is felt an injustice if one branch of a trade shall be made to pay for another. The decrease in exports is especially great to the western countries, while to the east it has improved.

The Society of Envelope Works reports diminished orders to the extent of 20 to 25 per cent. The same applies to the concerns making cardboard boxes. Pulp and cardboard is now 30 per cent higher in price. Nearly in all special industries using paper, loss of business is reported. Many complaints are made about bankrupt concerns or those unable to pay for other reasons. The future is uncertain, gloomy, and the opaque conditions prevents any free movement.

Statistics Tending to Show Scarcity of Paper

The democratic fraction of the Parliament questioned the government respecting the alleged scarcity of paper for the press, and in reply were furnished with the following figures:

Year	Production	Consumption	Exportation
1921	34,821 vans*	not given	6,299 vans
1922			
Jan.	2,961 vans	2,368 vans	593 vans
Feb.	2,483 vans	2,148 vans	334 vans
Mar.	3,240 vans	2,532 vans	672 vans
Apr.	2,785 vans	2,268 vans	423 vans

*A van is a German car holding 10,000 kilogrammes, or approximately 25,000 pounds of paper. At this approximation the 1921 production would represent roughly 384,000 tons.

The above figures relate only to newsprint. The demand of the dailies is estimated at about 2,000 vans monthly. Therefore the paper works have supplied the press with much more than there is demand for. If at some points, however, there is still difficulty in obtaining paper, the reason lies in the fact cited previously, namely that the enormous purchases of paper by certain publications and by manufacturers of paper articles so depleted the available supply that the present increase has not yet brought the market back to normal.

Press Fears Conditions Threaten Doom

For several weeks there was an outcry in all newspapers regarding their threatened doom, and as a matter of fact several thousand periodicals, dailies and weeklies, have ceased publication last and this year. To overcome this evil, the Reichstag has received the following project for a law to overcome the evil.

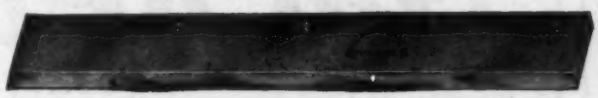
1. The government is authorized to fix prices for woodpulp, cellulose, and printing paper on the basis of self-costs. It has the right to fix these as maximum prices. The expenses of these researches to be borne by the press.

2. For assisting to relieve the "suffering press," the different states have to pay a special tax from July 1st, which makes the total per head of population two marks for the third quarter. If the sum is insufficient in future, a higher tax can be levied. The States are authorized to obtain these sums from the owners of forests.

Compulsory Rationing Not Contemplated

The government recognizes the economic "misery" of the press and is making efforts to assist the publishers. Besides a favorable tariff on the railways and mails, a cheapening of the paper is aimed at. The compulsory rationing still in force with bread is not contemplated in newsprint, nor is a further taxing of exports. Large sums are hoped to be obtained from taxing the owners of forests. As these are quite independent and can adapt the price for wood to the world prices they are not half so handicapped by unfavorable economic conditions,

SIMONDS
MANUFACTURING COMPANY
Machine Knives
FOR
Paper and Pulp Mills



Highest Quality—Finest Steel—More Production
Write for Catalog and prices
SIMONDS MANUFACTURING CO.
Fitchburg, Mass. Chicago, Ill.

BRONZE
Beater Bars

Manganese Bronze Beater Bars
Will outlast steel bars 5 to 1
Will not discolor paper stock
Are tougher and stronger than steel
Will not corrode
Will save money in operating costs
Tensile strength, 75,000 lbs. Yield Point, 38,000 lbs. Elongation, 20% in 2 in.

Hy-Ten-Sl Bronze Bars for Jordan Engine Fillers
Outwear anything on the market, by a wide margin.
This metal is as strong as Nickel Steel.
Tensile strength, 110,000 lbs. Yield point, 60,000 lbs. Elongation, 12% in 2 in.

Dill & Collins Co. wrote an interesting letter about these bars. Write us for a copy of it.

AMERICAN MANGANESE BRONZE CO.
Holmesburg—Phila—Pa.

Appleton

Felts & Jackets

Because of our service and the quality of our felts, we have for a long number of years furnished felts for some of the largest pulp, board, news and writing mills in the country.

Manufactured By

APPLETON WOOLEN MILLS

APPLETON — WISCONSIN

This style machine slits and rewinds all kinds and thicknesses of paper from tissue to box board—filled and gummed stock, and combined cloth and paper.

For Slitting and Rewinding This Is the BEST MACHINE Made

Handles a mill roll up to 40 inch diameter and rewinds on one shaft up to 40 inch in diameter.

The paper is rewound by the use of three rolls; the top roll by its pressure gives compactness to the rewound paper roll and makes it easy to handle the poorest grades of paper without breaking. That serious defect in some machines arising from a one-side drive for the top pressure roll is wholly overcome by our double drive which gives uniform bearing on the rewound roll. This top pressure roll is easily and quickly raised for changing the roll by turning a crank. Counterweights can be increased or decreased in weight according to requirements.

Another prominent feature of this machine is its convenience. It has a device for separating the slitting cutter shafts to facilitate threading the paper through the machine. All adjustments necessary are made from the operator's place which is at the rewinding end of the machine.

The slitting cutters which are on parallel shafts give a clean, shear cut. The cutters may be quickly adjusted to different widths from 1¼ inch upward, and are clamped to the shafts with ample bearing surface so that they always run perfectly true.

MEISEL PRESS MFG. CO.

944 Dorchester Ave. BOSTON 25, MASS.

and are thus quite fit to bear an extra tax. This will not exceed 20 per cent of the sales price for wood.

Austrian Market Depressed Still Further

The market in Austria is very confused. Prices for raw materials and wages have increased incredibly, and all allied lines are therefore compelled to increase their prices accordingly. Two contributing causes are the decrease in Austrian money and the higher prices obtained from exports than can be obtained in the home markets. Paper for bags, sacks and printing is not to be had at present, while orders for better grades require very extended delivery periods and no fixed prices.

Paper Company Inaugurates Educational Plan

A new advance in educational lines interesting to note is that the Nekoosa-Edwards Company of Nekoosa, Wisconsin, is engaging extensively in an educational campaign in the interests of its employees. This work, which includes extention courses in papermaking and academic courses, is being done under the direction of Mr. F. H. Rosebush, who is in charge of industrial relations, while Marshall C. Graff, who is head of university extension work in that district, is cooperating. All of this educational expansion is being done, of course, under the direct supervision of company officials and at their instigation.

The company proposes that any of their employees who desire to take any of the offered courses undertake the original cost of the course themselves, with the proviso that upon completion of the course the entire money expended is returned the employees by the company. This plan will also be put into operation at the Port Edwards mill, and its results will be carefully noted by others interested in this experiment by the Nekoosa-Edwards Company.

A mechanical change, made on a new high speed newsprint machine at the Wisconsin Rapids plant of the Consolidated Water Power & Paper Company, will be of particular interest to the paper industry at large, as the proper incline of the wire, especially in connection with fast jobs, has been an important problem among paper machine engineers.

The change consisted of lowering the Fourdrinier from a thirty-six inch pitch to a sixteen inch pitch, resulting in a decided alteration of the arrangement of the wet end of the machine. This same alteration, which has been effected with success on high speed machines in other mills results, it is said, in better running conditions and a closer formation of paper.

Warren Paper Products Company Buys Ground for Factory Building

Announcement of a new modern factory building upon which construction work will begin in the near future was made Saturday by the Warren Paper Products company, of Lafayette, Indiana.

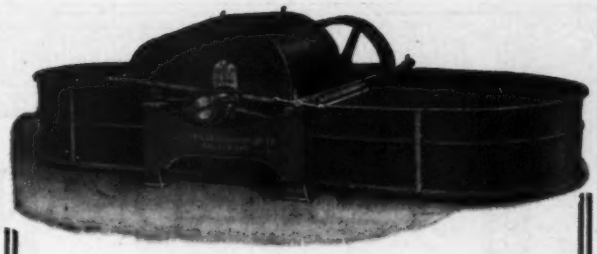
This company was formed about a year ago by H. M. Warren and his son, D. M. Warren, of Chicago. The company began production on November 1st and its business has grown in leaps and bounds. Paper boxes of various kinds are manufactured by them. Plans are now being drawn by local architects and construction work will begin as soon as specifications are completed. The new building will be equipped with the most up-to-date machinery.

Old Mill Dismantled

The Glen Mills Paper Mill, famous in the Chester Valley in Pennsylvania as the place where for many years all the paper used in making currency and bonds for the United States Government was manufactured, are to be dismantled. The plant itself has been shut down for a number of months following a long period of adversity since the Government made a change in its policy and had banknote paper manufactured elsewhere.

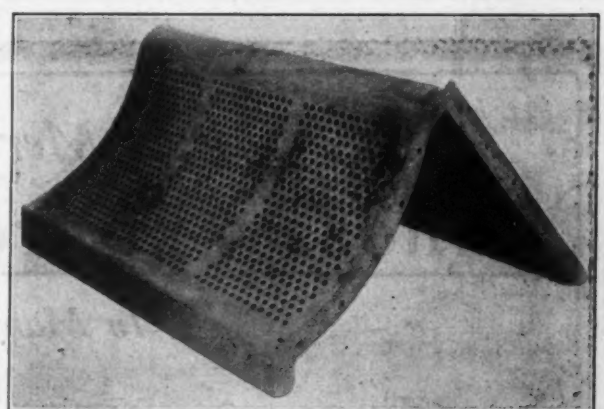
James M. Wilcox, who built the Glen Mills in 1836, was the inventor of a secret process of making paper which made counterfeiting very difficult, and the mills were built for the express purpose of producing this kind of paper. Mr. Wilcox, at the time of his invention, was already operating another plant known as Ivy Mills which had been founded by his ancestors in 1720.

Reported rumors that there had been a consolidation of two big Chicago newspapers, the Chicago Daily News and the Chicago Tribune, in the construction of the Wigwam Paper Mills on the Elko River, B. C., appear to be without foundation. Mr. W. A. Strong, business manager of the News,



"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*

Brass, Copper and Iron Cloth

Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works

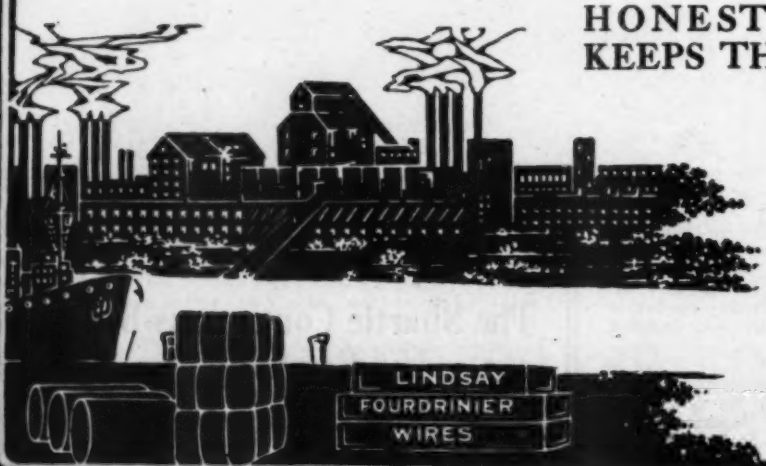
Established 1842 SPRINGFIELD, MASS.

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills

HONEST SERVICE
KEEPS THEM THERE



They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

refutes absolutely any connection of that publication with the new mill, while in the office of the Ontario Paper Company, which represents the Tribune's newsprint operations in Canada, it was said that no such information was available to them.

News Personals

Under the terms of the will of Frederick Bertuch, who died recently, fifty thousand dollars is to be given Cooper Union to provide for the advancement of science and art. Various large bequests are made to schools and universities as well as to various charitable organizations, particularly to the Bowery Mission and Young Men's Home of New York for the maintenance of its bread line. None of the above named requests will be paid until after the death of Mrs. Bertuch. Mr. Bertuch, whose obituary appeared in last month's PAPER INDUSTRY, was one of the pioneers in the importation of wood pulp into the United States, and left an estate valued approximately at $175.000.

Gilbert Mericle, formerly superintendent of the Menasha mill of the Whiting Paper Company, left that company on October the first to take a similar position with the American Writing Paper Company at Holyoke, Mass.

The latter company also announces the promotion of Mr. John J. Dooley from assistant manager to manager of the Traffic Department. Mr. Dooley, who has been with the American Writing Paper Company since 1917, has been in railroad freight work for seventeen years, much of the time with the Boston & Maine Railroad at Holyoke and other points.

H. Norwood Ewing, doing business as the H. Norwood Ewing Paper Company, paper selling agent, at 233 Broadway, New York, filed a petition in bankruptcy on September 18, listing liabilities of $105,205 and assets of $41,198. Principal creditors are the Phoenix Toilet & Paper Machine Company, $32,877; Crescent Paper & Machine Company, $24,055, and the Clayville Paper Mills, $7,749. Judge Mayer later appointed Emil Frankel receiver for the firm under $500 bond.

Clarence F. Williams, for some years with Marcus Ward & Co., Inc., and more recently with Coyle & Grant, of New York, has opened offices in Room 1129, at 200 Fifth avenue, New York, where in the future he will represent in the New York territory the Hopper Paper Company, of Richmond, Va., and Johnsonburg, Pa., and the B. Hopper Company and the Kalamazoo Stationery Company, of Kalamazoo, Mich.

Herbert P. Brock, formerly of the E. J. Keller Company, dealers in and importers of papermakers' materials, of 200 Fifth avenue, New York, is now associated with the Waste Material Trading Corporation, of 115 Broadway, New York. The latter concern, organized less than a year ago to import and deal in rags, paper stock, etc., has made rapid strides in recent months.

George W. Sisson, Jr., president of the Racquette River Paper Company, of Potsdam, N. Y., and former president of the American Paper and Pulp Association, returned a few days ago on the steamer Celtic from several months' tour of Europe during which he made a study of paper manufacturing conditions in the Scandinavian countries.

Charles G. Neidel of The American Writing Company, formerly secretary to the general sales manager, has recently been appointed salesman. He was, before his connection with this company, chief clerk and accountant for the city of Springfield, in the Department of Streets and Engineering.

R. D. Cunningham announces that he has severed his connection with S. Birkenstein & Sons, Inc., dealers in paper manufacturers' supplies, of Chicago, Philadelphia and New York, and that in the future he will be located at his old address, Green Island, Albany County, N. Y.

The New York office of R. Goldstein & Son, dealers in foreign and domestic papermaking rags with headquarters in Baltimore, Md., has been removed from 200 Fifth avenue to 68 New Chambers street, where the firm is occupying a warehouse.

H. Reeve Angel & Company, importers of paper, of New York, have increased their capital from $50,000 to $100,000.

BATHURST LUMBER COMPANY, LIMITED

PRICE & PIERCE, LTD.
17 East 42nd Street, NEW YORK CITY

ARE NOW THE

SOLE SELLING AGENTS
for Bathurst Pulp

Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

BATHURST, NEW BRUNSWICK, CANADA

Quality: It means more than price

The B Co INC

"Hafslund Bear"
"Forshaga"
Bleached Sulphite
"Klarafors"
Easy Bleaching Sulphite
Strong Unbleached Sulphite

PULP

"Hurum"
"Bamble"
Extra Strong Kraft; Bleached and Bleachable Sulphate
"Edsvalla" 50% Moist
"Dejefors" Dry
White Spruce
Ground Wood

Tonnages available on dock for prompt shipment

THE BORREGAARD CO., INC.
200 FIFTH AVENUE NEW YORK CITY

SAFETY CALENDARS
FOR 1923 READY NOW

Placing this Safety Reminder in the homes of your workers will prevent accidents and decrease accident costs.

This is a reproduction of the Calendar cover. The original for this and for the twelve Calendar pages are beautiful oil paintings by R. James Stuart, one of America's leading artists.

A Safety Campaign *for* 2 Cents A Month

The gift of Safety Calendars by employers to their workers has become a regular annual event in thousands of plants throughout the country—because—

1. It is a gift that all are pleased to receive..
2. It expresses a kindly thoughtfulness that every employer is glad to show to his employees.
3. It attacks the "take-a-chance" attitude of the careless workman.
4. It strengthens his spirit of caution toward avoidable risks.
5. It pays a big profit in employee good will and lowered labor turnover.

Sample Calendar upon request.

THE NATIONAL SAFETY COUNCIL

NON-COMMERCIAL *CO-OPERATIVE* *NOT-FOR-PROFIT*

168 NORTH MICHIGAN AVENUE CHICAGO

Leo Schlick, mill architect and engineer, has moved his Boston office into larger quarters at 314 Beacon Street. Mr. Schlick maintains his main offices in Boston and the change has been necessitated by constantly increasing business.

E. Solomon, vice president of the American Woodpulp Corporation, importers of wood pulp and other papermaking materials, of 347 Madison avenue, New York, returned from an extensive business tour of Europe on September 22.

I. L. Gartland, for several years connected with the Union Bag and Paper Corporation, has assumed a responsible position with J. F. Patton & Co., Inc., of New York, importers and wholesale dealers in wood pulp and paper.

F. Mackey has tendered his resignation as superintendent of the new paper mill of the J. Spaulding & Sons Company, Inc., in Tonawanda, N. Y. Mr. Mackey has made no announcement regarding his future plans.

Pell W. Foster, Jr., 50 Congress Street, Boston, has been appointed New England District Manager by the Power Specialty Company. Mr. Foster was formerly in the New York office.

C. Elmer Pope

C. Elmer Pope, who died at Millinocket, Maine, on August 29th, has long been connected prominently with the paper industry. At the time of his death he was consulting engineer for the Great Northern Paper Company, in addition to being interested financially in many inventions which he himself had perfected. Probably his greatest service in the course of a long connection with the paper industry was the invention and completion of the air compression device which takes the place of hand manipulation whereby machine speeds are no longer limited by a tender's skill. This device created such a radical speeding up of work that it led to the formation of the Pope Appliance Corporation to handle the marketing of the invention.

Mr. Pope leaves a wife, two daughters and three sons, the eldest of which has been in the paper industry since his graduation from the University of Pennsylvania. He also leaves a brother, Edward J., of the Paper Engineering Company of St. Joseph, Michigan.

Allan A. Wheat

On September 15th at Petoskey, Allan A. Wheat, well known throughout the paper industry for many years, died following an illness of several months. At the time of his death Mr. Wheat was associated with the Northern Michigan Company with headquarters at Petoskey. Previously he had been connected successively with the Agawam Paper Company at Mittineague, Massachusetts; the Sterling Paper Company at Hamilton, Ohio; the Strathmore Paper Company; and the Kalamazoo Paper Company. Later he organized the Wheat Paper Company at Elkhart, Indiana, which he managed until he removed to Petoskey to become active in the affairs of the Northern Michigan Company there.

Herbert C. Fallinger

Herbert C. Follinger, manager of the Chicago office of the Chain Belt Company, died of pneumonia at his home in Chicago on September 27th. He had been ill but a few days, and the announcement of his death will come as a shock to his many friends in the industrial world, where he was well known.

WANTED—
Box Board Machine

Trim preferred 116" or wider—
Must be in excellent condition.
Give full description of machine and equipment, and price F. O. B. cars shipping point.

Address F. B. D., c/o The Paper Industry.

August, 1921, Copies Wanted

The Paper Industry will pay 25 cents each for a limited number of copies of the August, 1921, issue—Vol. 3, No. 5.

EXECUTIVE WANTED

General Manager for a two machine mill making book and bond paper. Must be a practical paper maker and must have had successful experience in a similar position. This is a good, permanent position for a high grade man. Address reply to box 40, care of The Paper Industry.

Friction Has No Chance

to create trouble when you use

"SHURFLO"

Wick *Feed*

OIL CUPS

They're economical, too, saving one-third to one-half of your lubrication cost. Try some, free, for 60 days. Capacities ¼-oz., 1½-oz., 3-oz., 5-oz. and 10-oz. What sizes shall we send? Folder free.

HUNTER PRESSED STEEL COMPANY
600 Pierce Street Lansdale, Penna.

BUYING

O. S. Dependable Cranes

AND

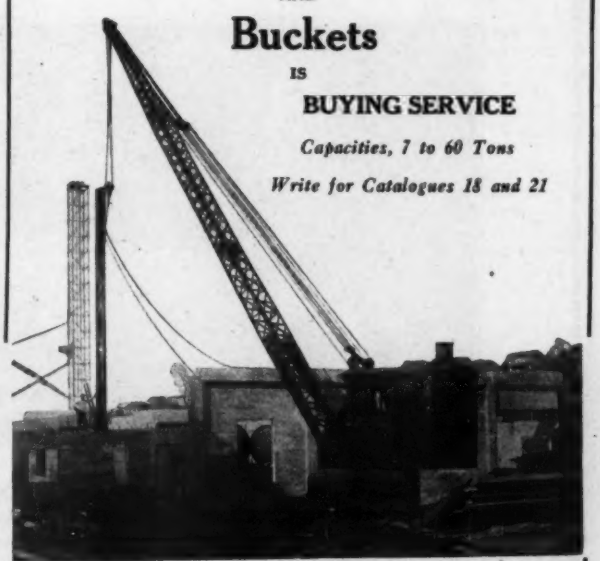
Buckets

IS

BUYING SERVICE

Capacities, 7 to 60 Tons

Write for Catalogues 18 and 21



Orton & Steinbrenner Co.

Offices CHICAGO, ILL. Shops HUNTINGTON, IND.

The BLACK-CLAWSON Co.

HAMILTON, OHIO

Builders*—Paper and Pulp Mill Machinery—*for

INCREASED PRODUCTION **SERVICE ALWAYS**

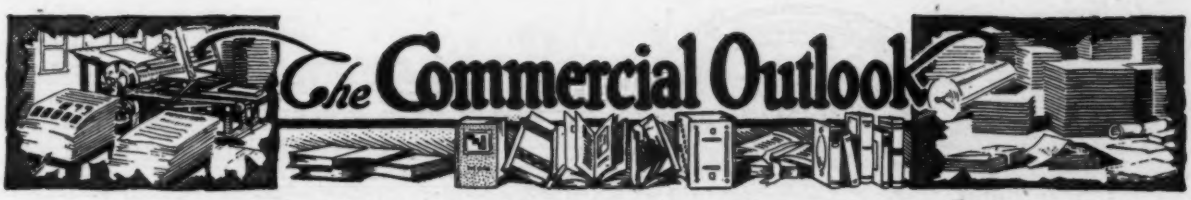
BARRE GRANITE IN PRESS ROLLS

Is Revolutionizing the Whole Paper Making Industry

If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

Jones Brothers Company

BARRE, VT. **BOSTON, MASS.**



New York, October 2, 1922.

ON EVERY hand are indications of greater stability, growing activity and increasing firmness in the paper industry. Not in a long time has the situation presented so many encouraging aspects, nor have indications pointed so strongly to the industry being on the threshhold of a period of prosperity. Many in the trade look for market conditions during the next several months which have not been experienced since the memorable boom following the world war. In fact, it is not going too far to say that business already has improved to the extent that boom conditions actually are being felt. No one looks for a market of exceptional breadth or characterized by any inflation, but there is a general feeling that paper business in the months to come is going to surpass anything experienced in the last two years, both as to volume and healthiness.

Improvement in the paper market is not due, fortunately, to any interior workings within the industry. It is founded on a general revival of commercial activity which is affecting practically all commodities and felt in all directions. More demand for paper is the result of larger consumption of paper. More consumption of paper can be attributed to general trade expansion, primarily caused by the consuming public opening up its purse strings now that it has regained confidence in commodity prices and now that labor conditions are improving to a point where the working man has more money to spend. Everyone acknowledges that the present increase in business in paper is of the healthiest character. Consumers and jobbers could not have been induced to buy more paper if their requirements did not warrant; numerous signs are evident that the paper that is being shipped out by paper mills is going almost direct into consumption.

It is indeed gratifying to note how very confident business men are in regard to the outlook. Interests allied with all the major industries of the country, as well as the minor, are optimists from the word go. The same merchants and manufacturers who a few months ago refused to see a ray of blue on the business horizon are today predicting most favorable conditions in the months to come and are looking forward to busy times and stable prices. The new tariff passed by the Republican Congress should help materially in improving business. It is an axiom that good business is based on how much money the working man has to spend; the protective tariff should lead to increased manufacturing activity in the United States, create more jobs and make for higher wages, thus putting a greater amount of money into circulation and broadening the market aspect for all commodities.

Business in paper is built on business in various other industries. Advertising comes from manufacturers and merchants when they are moving their wares; wrapping and tissue paper are used in the distribution of products, as is paper board of various kinds; fine papers are consumed in the interchange of correspondence regarding business transactions. With prospects in the steel, woolen, cotton, foodstuffs, chemical, clothing and numerous other basic industries so very favorable, it stands to reason that the paper industry has much to look forward to during the next few months.

The two strongest branches of the paper industry at present are those relating to news print and box board. Demand for print paper is exceedingly active. The reason for this is none other than increasing consumption. Latest available figures show that consumption of news print in the United States is setting a new high record this year, and should approximate 2,300,000 tons. In 1920, the previous banner year, roughly 2,100,000 tons were used. News print consumption in the first seven months of 1922 in this country totaled 1,154,943 tons, compared with 1,019,601 tons in the same period last year and 1,029,597 tons in 1920. Advertising in newspapers of the country for the period was 2 per cent ahead of last year, and the heavy consumption also can be attributed to the many circulation campaigns waged by the big city dailies. Better business conditions in the coming fall and winter months are expected to increase advertising, so that a continuation of the present rate of paper consumption seems likely.

The last Federal Trade Commission report shows a sharp jump in print paper production in August over that of July. A total of 133,236 net tons of total news print was produced by domestic mills in August, against 120,839 tons in the preceding month, and compared with 102,277 net tons produced in August a year ago, 128,818 tons in August, 1920; 113,413 tons in August, 1919, and 113,731 tons in August, 1918. A pleasing feature of the report is that in spite of the jump in production in August mill stocks decreased during the month from 21,156 net tons at the beginning of August to 19,902 tons at the close of the month, showing that manufacturers not only shipped out all of their current output but also a part of their stocks.

No further change has occurred in news print prices. Quotations are very firm at a basis of 4 cents a pound f.o.b. mills and publishers are reported meeting the prices asked without seeming hesitancy. Reports from Canada say that it is believed Canadian manufacturers of news print will be satisfied with a moderate increase in price when next year's contracts come up for consideration. An advance from the present price of $70 a ton seems inevitable and a return to at least a $75 rate appears probable. That was the price fixed by Canadian producers a year ago as a fair rate under conditions then existing and which was maintained until the leading United States producer cut to $70.

Book papers have strengthened to a marked degree. Quotations all along the line have been advanced, and 6 cents a pound is about the bottom price mentioned on machine finished book while most mills quoted 6.25 to 6.50 cents f.o.b. consuming centers. Coated book is quoted at from 9.50 cents upward, the rise in this grade of paper being largely attributed to the higher cost of casein.

Paper boards of every description are moving in big volume and at constantly rising prices. Paper box manufacturers are busy and are ordering board freely both against immediate and forward requirements. Prices on plain chip have steadily advanced until $60 a ton is about the lowest named by mills at present, with filled news board quoted at $62.50 to $65, straw board at $55 and single lined chip at $75. Even at these prices producers contend there is not a fair profit in making board because of the high cost of paper waste and coal, and it would not be surprising to witness further sharp rises in board values.

There is a growing demand for fine papers. Jobbers are once more laying in stocks, and the call for supplies from consuming sources is persistent. Fine paper prices are firm and tending upward. Tissues and wrappings are firm and in steady demand.

New Uses for Paper

A new addition to the long list of exportations from Portland, Oregon, is that of old newspapers, which are to be utilized as lining in house building in Java. San Francisco has, for some time, been shipping bales of newspapers to Java for use in building construction where they have been declared far more economical than other substitutes as to first cost.

In China, it is well known, that old newspapers are frequently utilized for wrapping for firecrackers as well as for ordinary wrapping paper, but this is a new departure into the building trades.

Another use for paper has been discovered in the recent announcement of a manufacturing company that it has perfected a waterproof umbrella. This article is composed of two inverted cones mounted on a stick, waterproofed by a secret process, and built to withstand a twenty mile an hour wind, or to face a thirty mile gale. The inner cone, which is smaller than the outer one, takes the place of ribs in an ordinary umbrella. The entire article is prepared to retail at twenty-five cents, and although primarily a "one trip" umbrella, will, it is claimed, stand repeated use. Detroit is responsible for rumors calculated to make one believe that the new Fords may be papier mache. Glue, cotton and formaldehyde are some of the elements mentioned as composing this substantial material. The Germans have experimented with this idea for a long time and have utilized an improved papier mache in carriage making. They use an impregnated wood pulp, owing to their lack of cotton.

SODA ASH
CAUSTIC SODA

Sole Selling Agents

EDWARD HILLS SON & CO.
21 East 40th Street, New York

DIAMOND ALKALI COMPANY

MANUFACTURERS OF

Soda Ash 58%
Modified Sodas

ALKALI

Caustic Soda 76%
Special Alkalies

BICARBONATE OF SODA, U. S. P.

Our complete Works, located at Painesville, Ohio, directly situated on three Trunk Line Railroads, are in position to serve you to advantage.

Address inquiries and communications to our general offices at

PITTSBURGH PENNSYLVANIA

Papermaking Rags

Increasing firmness marks the situation in papermaking rags. There is a steady and growing demand for practically all grades, and while no broad changes in prices have occurred during the past several weeks the trend of values has been almost constantly upward, and fundamentally the market has become stronger day by day. It is but obvious that with paper mills in need of rag stock, dealers and importers are taking advantage of conditions and are asking higher prices, and indications are that consumers are sufficiently in want of supplies to cause them to meet the advanced quotations. The fact that the rise is a gradual one, however, shows it is healthy, and, when one stops to compare, it will be found that rags are not quoted at relatively as high prices as many other kinds of papermaking material.

The feature of the market is the consistently good call for low grades of rags suitable for felt manufacture. Roofing paper mills have been actively in evidence as buyers and have, in the aggregate, absorbed fairly large quantities of rags during the past month. Prices nevertheless have undergone no important change, this apparently being due more to the heavy importations of rags from Europe than to any other reason. There seems little doubt that were it not for imported supplies paper manufacturers would be compelled to pay exorbitant prices for rags, because proof is not wanting that domestic stocks are not what they usually are; furthermore that even when dealers exert extra effort to get rags they are not finding normal supplies at collection sources. Domestic supplies have, of course, increased in recent months since higher prices have stimulated collections and brought out stocks but authorities in the trade insist that incoming rags from country sources do not commence to measure up in quantity to the supplies received prior to the war.

It is indeed more or less surprising that prices of rags have not risen higher than they have in view of the big increase in consumption by paper mills. Unquestionably the secret behind this situation is the record-breaking imports thus far this year, which have not only filled the gap occasioned by the smaller domestic stocks but have also covered the requirements of consumers. It should be remembered that after the war Europe had tremendous stocks of rags stored up and that when shipping conditions became better stabilized and the need for rags in the United States began to be felt the movement of these big supplies to this country set in, and it has continued for some time. Now the question arises of how much longer can Europe fill the requirements of paper mills in this country? Importers assert that there has been a decided stiffening of prices on the other side of the Atlantic and that available stocks in France, Germany, Belgium, Spain, Holland, Italy and England have been greatly reduced. If rag consumption in the United States keeps up at the rate reached during the past several months it is therefore not beyond the realms of probability that prices will rise to much higher levels than now prevail. On the other hand, there is a strong sentiment opposed to any runaway market for rags, even among dealers and importers, and it is likely pressure will be brought to bear to prevent any inflation of rag values. Supplies in this country at present must be comparatively large, simply judging from the heavy importations recently, and it is probable, too, that paper manufacturers have bought ahead to a considerable extent so as to protect themselves against any sharp advance in costs. A consensus of opinion in the trade is that rag prices will hold very firm during the coming winter months with probably a further rise of a few dollars a ton in roofing stock and some of the other especially desired grades, and present prospects indicate that only this expectation will be realized if consumers exert caution in accomplishing their buying.

Roofing rags of No. 1 grade are selling in the East at around 1.45 cents per pound f.o.b. dealers' shipping points, and No. 2 stock is bringing an average of 1.35 cents. Slightly higher prices prevail in the Middle West. Old thirds and blues have improved their price position somewhat and are quoted at about 2.25 cents for repacked, and 1.80 cents for miscellaneous packing. Old whites are firm and in good demand at around 6.75 cents for No. 1 repacked and 4.25 cents for No. 2 repacked.

New cuttings of all grades rule firm in price and are moving in a steady way, with No. 1 white shirt cuttings particularly active at about 11.75 cents a pound at dealers' shipping points, unbleached muslins at 10.25 cents, light flannelettes at 9.25 cents, and black silesias at 6 cents. No. 1 washables are showing more activity at 4 to 4.25 cents a pound.

Foreign rags hold steady, with dark cottons featuring the movement, felt paper mills paying 1.30 to 1.35 cents a pound ex dock New York, Boston, Philadelphia or Baltimore.

Average quotations f.o.b. shipping points and ex dock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	11.50-12.00
White shirt cuttings, No. 2	6.00- 6.50
Fancy shirt cuttings	6.25- 6.50
Washables, No. 1	4.00- 4.25
Unbleached muslins	10.00-10.50
White lawns	10.00-10.25
Overall cuttings, blue	6.00- 6.50
Black silesias	5.75- 6.00
Light flannelettes	9.00- 9.25
Canton flannels, bleached	9.25- 9.50
Canton flannels, unbleached	8.00- 8.25
Shoe cuttings, bleached	8.50- 8.75
Shoe cuttings, unbleached	7.25- 7.50
Light silesias	7.25- 7.50
Linens, No. 1 white, foreign	14.50-15.50
Light prints, foreign	5.50- 6.00
Old Stock—	
Whites, No. 1 repacked	6.50- 7.00
Whites, No. 2 repacked	4.00- 4.50
Whites, house soiled	2.00- 2.25
Whites, street soiled	1.85- 2.00
Lace curtains	3.75- 4.00
Thirds and blues, rough	1.75- 1.85
Thirds and blues, repacked	2.15- 2.35
Black stockings	3.00- 3.25
Cotton canvas, No. 1	3.75- 4.00
White cotton batting	4.00- 4.25
Roofing, No. 1	1.45- 1.55
Roofing, No. 2	1.35- 1.45
Dark colored cottons, foreign	1.30- 1.40
Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	11.50-12.50
Light prints, foreign	2.25- 2.50

Rope and Bagging

Of much significance in the old rope trade is the extremely bullish sentiment existing among dealers and importers. There is a feeling prevalent that prices on old rope are due for considerable advancement during the coming winter, the reason for this being primarily the limited supplies of old rope available and the steady use of this commodity by paper mills. The market recently has shown little change of note. There has been a very firm undertone and business of consistently good volume has gone through, but prices remain at approximately last reported levels. Domestic manila rope in No. 1 condition is selling at 6 cents a pound at dealers' shipping points, with occasionally a transaction at a quarter of a cent per pound higher reported, and paper mills apparently are covering their needs without difficulty at these prices. Foreign manila rope is quoted at relatively cheaper prices than domestic, owing, it is said, to the poor quality of the rope being received from Europe, and sales to paper mills at 5.50 to 5.75 cents a pound ex dock New York have been recorded.

Old bagging is just about holding its own with no market feature in sight. Roofing paper mills are absorbing proportionately more bagging than tissue mills, and consequently bagging suited for the former is bringing very close to the same prices prevailing on No. 1 scrap which is consumed by tissue paper manufacturers. Old gunny bagging is moving in a routine way at maintained prices.

F. o. b. shipping point quotations are:

	New York and Chicago
Gunny, No. 1 domestic	1.10-1.25
Gunny, No. 1 foreign	1.00-1.15

Largest producers in the world of highest grade Brimstone —guaranteed 99½% pure—free of Arsenic and Selenium.

The
UNION SULPHUR COMPANY

In so far as possible we will be glad to offer advice or suggestions to prospective buyers who are using or may be contemplating the use of brimstone.

FRASCH BLDG., 33 RECTOR STREET
NEW YORK

WHITAR
TRADE MARK REG. U.S. PAT. OFF.
News Blue
Auramine

We Supply a Complete Line of

Aniline *and* Pigment Colors

for Paper Makers

SPECIAL SHADES OF COLORED PAPER OR SAMPLES OF DYESTUFF MATCHED AND COMPLETE FORMULAS FURNISHED

The White Tar Aniline Corporation
56 Vesey Street, New York City
Works: Kearny, New Jersey

EASTERN MANUFACTURING COMPANY

BLEACHED SULPHITE

Made from spruce grown in the forests of Northern Maine.

Send for Samples.

EASTERN MANUFACTURING CO.
501 Fifth Avenue NEW YORK

COLORS

Calender
Beating
Coating

SANDOZ

For all grades of stock

PROMPT LABORATORY SERVICE

SANDOZ CHEMICAL WORKS
INCORPORATED
238-240 Water St., New York

OUR SOURCE OF SUPPLY IS
SANDOZ CHEMICAL WORKS
Basle, Switzerland

Scrap bagging, No. 1	1.00-1.25
Roofing bagging	.95-1.00
Wool tares, heavy	1.40-1.60
Wool tares, light	1.20-1.40
Manila rope, No. 1 foreign	5.50-5.75
Manila rope, No. 1 domestic	6.00-6.25
Sisal strings	1.25-1.50
Mixed strings	.85-..95

Old Papers

The market for old paper continues in a condition bordering onto a boom. Demand for all grades is active, and prices have continued to climb until waste paper is today relatively about the highest-priced description of raw material used by paper and board mills. By way of comparison, No. 1 mixed paper is bringing prices only a matter of $2 a ton below the level at which roofing rags are selling, whereas normally roofing stock commands very close to double the price of mixed paper. Shavings are selling at prices within close proximity to the cost of wood pulp, for which they are a substitute; in fact, in some cases when the matter of shrinkage and waste is considered, it would appear as if certain of the high grades of old paper are bringing even better prices than pulp.

The reason for the present high level of waste paper values is nothing more than the law of supply and demand. Old paper of all kinds is moving in a brisk manner into consuming channels; board mills are busy and are absorbing paper waste in comparatively big tonnage, and there is little question that available supplies of old paper are not up to normal. As general business conditions improve and more new paper is consumed, thus leading to larger amounts of waste paper, it is obvious that supplies of old paper will increase; already there are indications of this, and the result is that conservative members of the trade express the opinion that prices on paper waste have about reached the top. There are, however, no signs of any easiness in the market, and it is likely that so long as consumption of waste paper continues at the present rate, prices on the commodity will hold firm at current stiff levels.

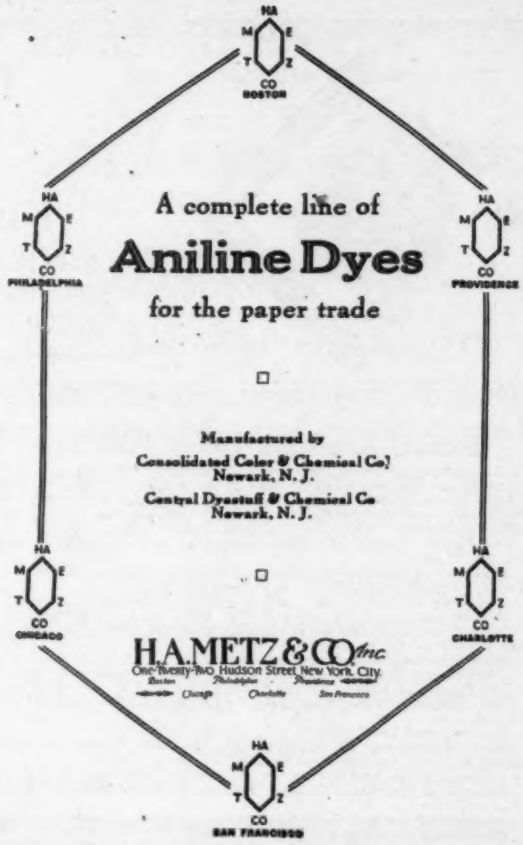
About the lowest dealers quote on hard white shavings of strictly No. 1 quality is 4.25 cents a pound at shipping points, and most quotations are nearer 4.50 cents. No. 1 soft white shavings are selling at from 3.90 cents upward, and colored shavings at 1.50 to 1.75 cents. Old magazines are firm at 2.70 to 2.85 cents a pound for No. 1 heavy books, and ledger stock is bringing 2.75 cents and higher. Flat folded news is selling at 1.30 to 1.40 cents per pound, No. 1 mixed paper at 1.20 to 1.30 cents, and common paper at 1.00 to 1.05 cents. Old kraft paper is moving freely at an average of 2.50 cents a pound.

F. o. b. shipping point quotations follow:

	New York and Chicago
Hard white shavings, No. 1	4.25-4.50
Hard white shavings, Nos. 2-3	3.50-4.00
Soft white shavings	3.90-4.15
Colored shavings	1.50-1.75
Heavy book, No. 1	2.70-2.85
Crumpled book, No. 1	2.15-2.25
Ledger stock	2.75-2.85
Kraft No. 1	2.40-2.60
Manilas, No. 1	1.75-1.90
White blank news	2.15-2.25
Over-issue news, No. 1	1.50-1.60
Folded news	1.30-1.40
Mill wrappers	1.30-1.40
Box board cuttings	1.25-1.35
Mixed paper, No. 1	1.20-1.30
Common paper	1.00-1.05

Chemical Pulp

The chemical wood pulp market is very firm. Demand for all kinds of pulp is lively, and prices have improved their position substantially during the past few weeks, with prospects favoring a further advance between now and the end of the year. Consumption of pulp is steadily mounting; statistics relating to the production of paper and paper board are ample proof of this, and as demand more than any other factor regulates the price of pulp, it is no wonder market levels are gradually moving upward.

The outstanding feature is the sharp jump of $10 a ton in bleached sulphite prices announced by domestic and Canadian producers a few days ago, bringing the quotation on No. 1 bleached up from 4.50 to 5 cents a pound at pulp mills. This advance was not unexpected; many in the trade had been predicting it owing to the increasing call for bleached

Western Paper Makers Chemical Company

Paper Makers Chemical Company

Kalamazoo, Mich. Holyoke, Mass. Easton, Pa.
Jacksonville, Fla. Pensacola, Fla. St. Austell, England

Rosin Size, Satin White, Clays, Fillers
Foam Killer, Felt Soap and Other Specialties

Standard Ultramarine Blues
For the Paper Industry
ASK FOR SAMPLE OF
NEOS R BLUE
The Highly Alum-Resisting Ultramarine
AGENTS
E. M. & F. WALDO, 10 High Street, Boston, Mass.
THE WESTERN PAPER MAKERS CHEMICAL COMPANY
Kalamazoo, Mich.
Manufactured by
THE STANDARD ULTRAMARINE CO.
Huntington, West Virginia

THE WATERBURY FELT CO.

SKANEATELES FALLS

New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

Technical Association Papers, Fifth Series

This volume of 176 pages is one of the most valuable contributions to the literature of pulp and paper manufacture yet issued. The contents include the following articles besides a directory of the officers and members of the Technical Association and the list of committees:

The Power Plant of the Paper Industry, by A. G. Darling and H. W. Rogers.

A System of Records to Maintain Uniformity of Basis Weights of Paper, by Parker K. Baird.

Hydrating Machinery for the Paper Mill, by George L. Bidwell.

Modern Lighting for Paper and Pulp Mills, by J. H. Kurlander.

Some Factors Influencing Yield and Strength of Pulp Cooked by the Soda Process, by Martin L. Griffin.

Sedimentation Control of Groundwood, by W. A. Munro.

The Efficient Production of Mechanical Pulp, by Adolph F. Meyer.

The Drying of Paper, by M. B. Littlefield.

The Electric Steam Generator, by Horace Drever and Frank Hodson.

Recovery and Its Control, by George K. Spence.

Relative Efficiency of the Automatic Magazine Grinder as Compared with the Pocket Type Grinder, by John J. Case.

Stamso—Cotton Linter Pulp, by Stewart E. Seaman.

Analysis of Reclaimed Cooking Acid for Sulphite Mills, by Gösta P. Genberg.

Analysis of the Raw Sulphite Acid, by Dr. Rudol Sieber.

Concerning Lignin and Lignin Reactions.

Contribution to the Knowledge of the Constitution of Spruce Wood Lignin.

Contributions to a More Exact Knowledge of the Chemical Constitution of Spruce Wood. Three articles by Dr. Peter Klason, translated by W. E. B. Baker and Carl L. Fineman, by special permission of the author.

Use of the Continuous Centrifugal, by J. R. Kessler and G. N. Collins.

The Chemistry of the Sulphite Process, by R. N. Miller and W. H. Swanson.

Standard Methods of Testing Materials, by N. F. Becker.

Color Effect of Rosin Size Emulsion on Finished Product, by C. H. Kent.

Sulphur in Sulphite Waste Liquor, by George Barsky.

Producing Bleach Liquor with Liquid Chlorine, by S. W. Jacobs and H. P. Wells.

A New Idea in Chip Breaking, by A. D. Wood.

Fuel Economizers in Paper Mill Operations, by George E. Williamson and G. C. Derry.

A New Idea in Chip Breaking, by A. D. Wood.

Bibliography of Paper Making for 1921, by Clarence J. West.

Proceedings of the Annual Meeting, April, 1922.

Sectional Meeting on Dyestuffs.

Sectional Meeting on Paper Testing.

Sectional Meeting on the Drying of Paper.

Discussion of Various Papers Presented at the Convention.

The volume described is obtainable, on order, from the Technical Association of the Pulp and Paper Industry, 18 East 41st Street, New York City, at $3.00 per copy.

THE NEWPORT COLORS *for Paper*

We wish particularly to call your attention to two especially good products for paper

Newport Fast Blue R W
Good to Light

Newport Direct Dark Blue H P
Level Dyeing, High Tinctorial Power.

"COAL TO DYESTUFF"

Newport Chemical Works, Inc.

Passaic, New Jersey

Branch Sales Offices
Boston, Philadelphia, Greensboro, N. C., Chicago
Providence

STOWE & WOODWARD CO.

Newton Upper Falls, Mass.

Makers of Rubber Covered Rolls

Maximum Resiliency WITH Minimum Softness

Long Life

sulphite and the sold-up condition of producing plants. It is understood that most of the large mills making bleached sulphite have nearly all of their output for the balance of the year sold on contract, but the new price will apply to shipments of pulp against these orders as well as on new business.

Kraft pulp is showing particular strength. Sales of No. 1 domestic kraft of extra fine quality have been made at 3.25 cents a pound f. o. b. pulp mills, and about the lowest quoted on kraft of No. 1 grade is 3 cents. Activity in kraft is due largely to the busy operations of board mills, which are consuming kraft pulp in large tonnage. Unbleached sulphite is firm and higher. About 2.75 cents a pound is quoted on No. 1 grade, while newsprint sulphite is selling at 2.50 cents upward. The market in its entirety is very strong and exhibiting increasing activity.

F. o. b. pulp mill quotations are:

Bleached sulphite	4.75-5.25
Easy bleaching sulphite	3.00-3.25
Unbleached sulphite, No. 1	2.65-2.85
News grade sulphite	2.50-2.65
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.25-3.50
Kraft, No. 1	3.00-3.25
Screenings, refined	.90-1.00

Mechanical Pulp

Along with the other papermaking raw materials, ground wood is showing a very firm price tone and is moving into consuming channels in increasing tonnage. It is reported that a majority of domestic producers have the bulk of their output for the remainder of the year under contract to customers, and it is said on high authority that buyers seeking pulp are having difficulty in locating available supplies for prompt shipment. Ground wood could scarcely help from ruling extremely firm with newsprint and box board mills operating at their present capacity. These plants consume the bulk of the ground wood produced, and as these two classes of mills represent the two liveliest spots in the paper industry at present, it is no wonder that mechanical wood pulp displays such a strong market undertone.

Quotations on prime spruce ground wood for prompt shipment range around $32 a ton f. o. b. grinding mills. Prices several dollars on either side of this figure are heard, quotations depending in large measure on the distance the pulp has to be hauled from producing to consuming point. Canadian manufacturers are reported quoting between $27 and $30 a ton at shipping points, while ground wood brought down from Nova Scotia in schooners to New York has sold at $33 and $34 a ton f. o. b. that city.

Chemicals

There is a good general demand for chemicals used by paper and pulp manufacturers, both against contracts and from transient buyers, and prices display firmness. The new tariff bill carries a duty of 2½ cents a pound on casein, which is substantially less than at first proposed, and there is a tendency to let down in quotations on this product. About 15 cents a pound is considered a fair market average. Bleaching powder is quotably steady at from 1.70 cents a pound upward, and crude sulphur or brimstone is firm at $18 per long ton at the mines. Caustic soda is quoted at about 2.75 cents f. o. b. works for the 60 per cent basis grade, and soda ash in bags at around 1.35 cents per pound.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	3.50- 3.75
Bleaching powder	1.70- 1.80
Brimstone (long ton, at mine)	18.00-20.00
Casein	15.00-17.00
Caustic soda, spot delivery	2.75- 3.00
China clay, domestic washed	8.00-10.00
China clay, foreign	14.00-18.00
Rosin, grade E	6.25
Satin, white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.30- 1.50
Sulphite of alumina, commercial grade	1.50- 1.60
Starch, papermakers', in bags	2.55- 2.80
Talc (ton)	14.00-17.00

The purchase of and agency for, is desired by a firm in Africa of stationery, wrapping papers, twines, etc. Quotations c. i. f. Kilindini, Mombasa. Price lists and catalogues desired. For further information those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, referring to Inquiry No. 3747.

RUSS GELATIN CO.
Factory—WESTFIELD, MASS.
MANUFACTURERS OF
GELATIN and GLUE
ANIMAL SIZING GLUE STOCK
LARGEST SPECIALISTS IN AMERICA ON
FINE WRITING PAPER SIZING
E. F. RUSS COMPANY 201 Devonshire S. BOSTON, U. S. A

CASEIN
Standard Quality
Lowest Prices
The Casein Manufacturing Company
15 Park Row New York

Uniformity
Hercules Wood Rosin is uniform in color and quality. It is clean, free from dirt, sticks, and other foreign substances. The supply is dependable. For sizing all but the very white papers it is particularly good.
The production of Hercules Wood Rosin in our three big plants is under the strictest chemical control. This insures adherence to your specifications and no variation from one lot to another.
If your requirements are of a special nature, our technical staff will be glad to co-operate with you.
HERCULES POWDER CO.
Wilmington Delaware
SALES OFFICES:
New York, N. Y. St. Louis, Mo.
Chicago, Ill. Louisville, Ky.
San Francisco, Cal. Buffalo, N. Y.
Chattanooga, Tenn. Duluth, Minn.

HERCULES
Naval Stores
Produced Under Chemical Control

Stebbins Engineering & Mfg. Co.
WATERTOWN, N. Y.
Designers, Equippers and Operators
Sulphite, Soda and Sulphate Pulp Mills
Digester and all Acid Proof Linings

James L. Carey
Paper Mill Architect and Engineer
208 N. Laramie Ave., Chicago, Ill.

J. H. WALLACE & COMPANY.
TEMPLE COURT BUILDING
NEW YORK CITY, U.S.A.
CABLES, TRIPLEX, N.Y.
PULP PAPER AND POWER PLANTS
ENGINEERS & CHEMISTS
INDUSTRIAL DESIGN
PLANT IMPROVEMENT
LABORATORY TESTS

B. M. BAXTER
Consulting Engineer
5716 Euclid Avenue, Cleveland, Ohio
Engineering Service for Paper Mills
Construction and Production
BOOK, BOXBOARD, BONDS AND LEDGERS, TISSUE, ROPE MANILAS AND SPECIALTIES

FERGUSON ENGINEERS
JOHN F. FERGUSON
Complete Pulp & Paper Mills, Investigation of New Enterprises, Special Heat & Power Applications, Hydro-Electric Developments, Steam-Electric Power Systems, Sectionalized Paper Machine Drives.
Analysis, Design, Construction, Operation Efficiency
Holyoke, Mass. 1210 First National Bank Bldg. CHICAGO, ILL.

GEORGE F. HARDY
M. AM. SOC. C. E.
M. AM. SOC. M. E.
M. ENG. INST. CAN.
Mill Architect and Consulting Engineer
Langdon Building
309 Broadway, New York
SPECIALTY:
Paper, Pulp and Fibre Mills
Water Power Development
Steam Power Plants
Plans and Specifications
Valuations, Reports
Consultation
Cable Address:
"Hardistock"
A. B. C. 5th Edition
Bedford McNeill
Western Union
Bentley's

V. D. SIMONS
Industrial Engineer
PULP AND PAPER MILLS, HYDRO-ELECTRIC AND STEAM POWER PLANTS
ELECTRIFICATION PAPER MILL PROPERTIES
39 S. LA SALLE ST.
CHICAGO

HARDY S. FERGUSON
CONSULTING ENGINEER
200 FIFTH AVENUE NEW YORK CITY
Member Am. Soc. C. E.
Member Am. Soc. M. E.
Member Eng. Inst. Can.
PAPER, PULP AND FIBRE MILLS INCLUDING BUILDINGS AND COMPLETE MECHANICAL EQUIPMENT
WATER POWER DEVELOPMENT
DAMS, STORAGE RESERVOIRS AND OTHER HYDRAULIC STRUCTURES
STEAM PLANTS
Examinations, Reports, Estimates of Cost, Designs, Specifications, Valuations

J. O. ROSS ENGINEERING CORPORATION
CHICAGO 30 E. 42d St. NEW YORK CITY BOSTON
PAPER DRYING SYSTEMS
HEATING VENTILATING
"STURTEVANT"
VAPOR ABSORPTION SYSTEMS

BROWN-WALES CO. SELAW IRON & STEEL
"Headquarters in New England" for
IRON AND STEEL and Kindred Materials
Immediate Delivery
Distributor for Armco Iron
BROWN-WALES CO., Boston 9, Mass. 261 Broadway, N. Y. C. 55 Church St., New Haven Bangor, Maine
BARS — SHEETS — STRUCTURALS

New Papers

Writing—	
White rag	16-40
White sulphite No. 1	11-20
Colored	13-40
Ledger—	
White rag	16-50
White sulphite	13-25
Colored sulphite	11-20
Colored rag	11-50
Bonds—	
White rag	14-40
White sulphite	9-20
Colored sulphite	10-25
Colored rag	15-40
Book—	
No. 1 S. & S. C.	6.25- 7.00
Machine finished	6.00- 6.50
English finished	6.00- 6.75
Coated and enameled	9.50-11.50
Lithograph, M. F.	9.50-12.00
Newsprint—	
Rolls, contract	3.75-4.00
Rolls, transient	4.00-4.25
Sheets	4.25-4.50
Side runs	3.25-8.50
Cover Stock—	
Coated, both sides	9.25-
Coated, one side	9.20-
Tissue—	
No. 1 white, 20x30	.80- .90
No. 2 white, 24x36	.70- .80
No. 1 manila, 24x36	.70- .80
Kraft	1.00-1.25
Wrappings—	
No. 1 kraft	6.75-7.25
No. 2 kraft	5.75-6.25
Boards—	New York and Chicago
Solid news	70.00-75.00
Straw	52.50-57.50
Plain chip	60.00-62.50
White coated chip	80.00-85.00
Manila coated chip	75.00-80.00
Binders' board	90.00-95.00

Correspondence Courses in Paper & Pulp Production Now Established

Out of the research and work connected with the preparation of the five volume set of text books, The Manufacture of Pulp and Paper, being prepared and compiled under the joint auspices of the American Paper and Pulp Association and the Canadian Pulp and Paper Association has grown another and greater service to the pulp and paper industry in the establishment of correspondence courses based on these books and offered to the paper industry by the Institute of Industrial and Domestic Arts, Gardenvale, Quebec, under authority of the Canadian Association.

Comprehensive List of Courses Offered

A syllabus of the courses offered has been prepared by the Institute of Industrial Arts, wherein one finds that, in addition to a thorough ground work in elementary work for the benefit of those who have been forced to leave school at an early age, there are very complete courses of the following in all their divisions:

Elementary Science	Mechanical Pulp
Sulphite Pulp	Sulphite and Soda Pulp
Beating and coloring	Paper Machine Operation

Paper Finishing.

Methods of Study Standardized

The elementary work includes Arithmetic and Elementary Applied Mathematics, Plan Reading, Chemistry and Physics, as well as Mechanics and Hydraulics, and Electricity. These must be thoroughly mastered before a student is qualified for further study. This is determined by written and carefully graded examinations. All of the courses of study are supervised by J. Newell Stephenson, M. S., principal of the school, and John Jesse Clark, M. E., Vice-Principal and former Dean of the International Correspondence School. In addition, the executive work of the Institute will be under direction of President James J. Harpell.

All of the work contained in the five volumes will be prepared in pamphlet form, extensively illustrated, and all individual study is done under direction of men well versed in the requirements and methods of the industry. Therefore, the advantages of this method of instruction in the paper and pulp field seem to more than outweigh the disadvantages of correspondence work in general, as it enables a student to adjust his hours of work, and develops will-power, self-reliance and clear thinking. It requires determination, and makes for the formation of deliberate habits, to set aside certain parts of ones day for study. This same deliberate habit of study is equally valuable in studying out particular problems in mill work, or in laying out a sequence of operations connecting up ones own department which other departments in a plant.

The method of study is that standardized in good correspondence schools, whereby papers are criticized, errors indicated, clear explanations of corrections noted, and the work returned. Special aid in difficult problems is always at a student's service, as well as in solving problems which come up in actual mill work.

Represents Most Modern Practice and Methods

Too much emphasis cannot be placed upon the value of a compilation such as this will be. Each individual pamphlet represents the best of modern thought and practice in pulp and paper manufacture, and each section is written by an expert in his line, with all manuscripts carefully checked by other technical and practical authorities in the subject. In fact the subjects covered are so comprehensive of every individual angle of the industry that it is a lengthy matter to review them all in print.

Among the names on the list of Faculty are many well-known in the pulp and paper industry, including T. Linsey Crossley; R. W. Hovey and Harry J. Buncke, of the Abitibi Power and Paper Company; Bjarne Johnsen, of the Hammermill Paper Company; Arthur B. Larchar, of the Penobscot Chemical Fibre Company; Henrik Grinstad and L. M. Smith, of the Brompton Pulp and Paper Company; Hugo Hansen, of the Eastern Manufacturing Company; E. C. Tucker, of the Crocker-McElwain Paper Company; Ernst Mahler, of the Kimberly Clark Company; Judson De Cew, Consulting Paper Technologist; Kenneth King, of the Dupont De Nemours Company; George Witham, Sr., of the Union Bay and Paper Corporation; George E. Williamson, of the Strathmore Paper Company; A. C. Bowness, of the E. B. Eddy Company; H. R. Harrigan, of the American Writing Paper Company; R. O. Harper, of the B. D. Rising Paper Company; W. D. Sommerville, of the Eastern Manufacturing Company; Dard Hunter, Paper Specialist; Clark Marion, of the Champion Coated Paper Company; Edward T. A. Coughlin, of the Allied Paper Mills; and Fred Curtiss, of the U. S. Bureau of Standards.

Representative of Entire Industry

With such a personnel and with the backing of both the American and Canadian associations this particular step forward in the history of the industry assumes an importance which it is hard to overestimate. It offers unlimited opportunity for those whose names are limited to avail themselves of the best and most authentic information in their particular field which it is possible to get. The completion of this work of research and education and its consolidation into a work of study and reference will be a momentous occasion for those in the pulp and paper field.

The plant of the Kennedy Car Liner and Bag Company at Greensburg, Ind., which has been operating with a small force, has been reopened on full time. With the full force the factory has a capacity of between 25,000 to 30,000 paper bags a day.

Plamondon Transmission Machinery

Products

Heavy Gearing and Friction Clutches for paper-mills, rubber-mills, tubemills, cement-mills, rolling-mills, stone quarries, and rock products, mining and coal-handling machinery, elevators and malt houses, turbines and water wheels, sugar refineries, packing houses, electric light plants, powder-mills, glass factories; cut gears and machine molded gears of all kinds.

Shafting, pulleys, hangers, couplings, collars, pillow blocks, worm-wheels, fly-wheels, and rope sheaves.

Makers of grey iron, and semisteel castings by analysis.

Special machinery built to order on modern tools at usual shop rates.

A. Plamondon Manufacturing Company

Engineers, Founders, and Machinists

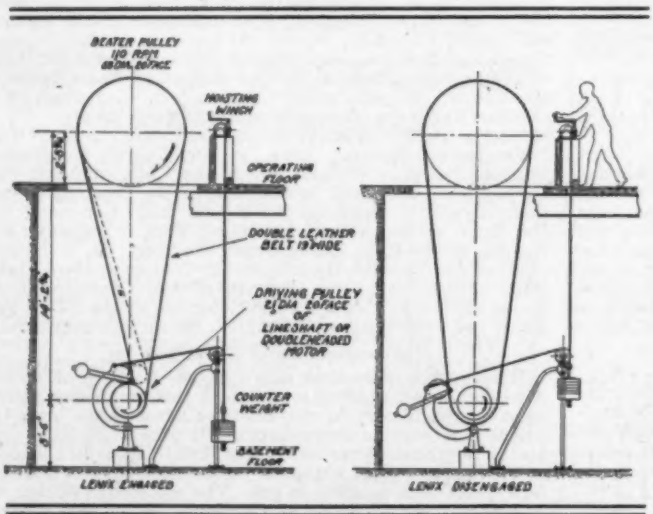
Established 1859—Incorporated 1877

Works and Main Office:

5301 South Western Boulevard Chicago, Ill.

Emergency Orders Receive Special Attention

THE KORAP*LENIX DRIVE



Permits the efficient installation of double-headed motors driving Beaters, or Beaters driven in groups from one motor, as exemplified in a number of successful installations in some of the largest paper mills.

There being no belt slippage with the Korap-Lenix it is unnecessary to stop one of a group of drives, as the Korap-Lenix automatically equalizes the varying belt stretches of several drives powered from the same shaft, the amount of take-up increasing the arc of contact between belt and pulleys. The Korap-Lenix is equally efficient with belt travel at any radial direction from horizontal to vertical.

The Korap-Lenix, on vertical drives, also serves as a starting and stopping device, as illustrated.

Booklet "Saving Slippage and Space," describes the Savings effected by the Korap-Lenix Drive. Ask for a copy.

F. L. SMIDTH & CO., Engineers

50 CHURCH STREET NEW YORK, N. Y.

* Improved Lenix Drive

Wood Pulp

The situation in foreign wood pulp is showing increasing strength day by day. With paper manufacturers in the United States buying in heavier volume than has marked their operations probably at any time since prior to the war, and with producers in the Scandinavian and other European countries having disposed of most of their output for the next few months, it is but logical for the price tone to be exceedingly firm and for market levels to be gradually climbing.

New York importers who have recently returned from Europe report a bullish situation in Scandinavia. Swedish pulp mills, it is said, are almost sold up for the remainder of the year, it being reckoned that the entire available supply until the closing of the Baltic will be only in the vicinity of 50,000 tons of all kinds of pulp since mills have the rest of their production contracted for. Moreover, it is reported that European consumers, including British paper manufacturers, have been actively in the Swedish market for pulp recently, thus removing a good supply which would doubtless otherwise have found its way to the United States.

Latest advices are to the effect that production of wood pulp in Sweden is about normal; that is, manufacturers there gradually increased their output until during the latter part of August a normal tonnage of pulp was produced. Shipments to America and to other consuming countries have been heavy, however, and it is asserted that Sweden, despite the fact that it had a carryover of no less than 190,000 tons of pulp at the beginning of this year, will have practically no carryover whatsoever into 1923, the diminished stocks and unsold production in the Scandinavian country reflecting the tremendous trade Swedish manufacturers of pulp have engaged in during the current year.

Importations of pulp into the United States continue large. According to Federal Trade Commission figures, a total of 90,637 net tons of chemical pulp of all kinds and 17,181 tons of ground wood were imported in July, which comes very close to approximating the record month of pulp imports. In June of this year 78,931 tons of chemical pulp were imported, and in May 51,659 tons. There is no question but that importations of wood pulp from European sources this year have been far in excess of any other year in the past. If imports keep up during the next several months at the rate of the last few months, it seems likely that an average of something in the neighborhood of 80,000 tons monthly will have been brought into the United States in 1922. When it is understood that before the war the import trade was accustomed to figuring beween 30,000 and 40,000 tons as a month's average shipments, it can readily be appreciated how great a supply of pulp has been imported into the country this year.

Prices on pulps in the domestic and primary markets are stiffening and advances have been scored in some cases. Kraft pulp is especially strong in value, and importers have mostly marked up quotations to a minimum of 2.75 cents per pound ex dock New York for No. 1 kraft. Bleached sulphite has firmed in sympathy with the rise in domestic pulp of this description, and quotations on No. 1 bleached range from 4.25 to 4.75 cents per pound, with sales recorded at the higher figure in certain instances. Unbleached sulphite of No. 1 quality is quoted at 2.75 to 3 cents, and easy bleached sulphite at 3 to 3.25 cents.

Receipts at the port of New York in September and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$ 4.25-$4.75
Unbleached sulphite, No. 1	2.75- 3.00
Easy bleaching	3.00- 3.25
Mitscherlich unbleached	2.90- 3.15
Kraft	2.70- 2.85
Ground wood, per ton	35.00-

E. M. Sergeant & Co., 600 bls. from Gothenburg, 750 bls. from Christiania and 157 bls. from Copenhagen; H. Hollesen, 2,324 bls. from Bremen; Seggerman Bros., 700 bls. from Copenhagen; Scandinavian-American Trading Co., 180 bls. from Gothenburg and 750 bls. from Gefle; A. J. Pagel & Co., 7,950 bls. from Gothenburg, 5,400 bls. from Gefle, 3,170 bls from Hornefors, 3,000 bls. from Husum, 4,690 bls. from Domejo, and 4,200 bls. from other Swedish ports; Nilsen, Lyon & Co., 150 bls. from Trondhjem; American Woodpulp Corp., 3,100 bls. from Hamburg, 1,500 bls. from Gefle and 250 bls. from Swedish ports; J. Andersen & Co., 600 bls. from Porsgrund, 1,800 bls. from Christiania and 770 bls. from Gothenburg; Perkins-Goodwin Co., 2 bls. from Christiania; E. Naumberg & Co., 600 bls. from Christiania and 1,000 bls. from Gothenburg; Mechanics & Metals National Bank, 1,500 bls. from Christiania; Tidewater Paper Mills Co., 24,604 bls. ground wood from Liverpool, N. S., and 12,572 bls. from Gaspe; Borregaard Co., 200 bls. from Christiania; Johaneson, Wales & Sparre, 750 bls. from Gothenburg and 7,200 bls. from Harnosands; Dynas Atkiebolag, 2,700 bls. from Gefle; Brown Bros. & Co., 2,750 bls. from Gothenburg; Castle, Gottheil & Overton, 257 bls. from Rotterdam; M. Gottesman & Co., 580 bls. from Rotterdam; National City Bank, 219 bls. from Antwerp; National Bank of Commerce, 771 bls. from Hamburg and 1,000 bls. from Gothenburg; Equitable Trust Co., 1,200 bls. from Trondhjem; Guarantee Trust Co., 2,200 bls. from Gothenburg and 1,200 bls. from Sikea; International Acceptance Bank, 1,000 bls. from Gothenburg; Bulkley, Dunton & Co., 1,500 bls. from Gefle; Acer & Co., 7,919 bls. from Murray Bay; Order, 900 bls. from Christiania, 2,500 bls. from Gefle and 5,745 bls. from Murray Bay.

Paper Stock

The feature of the import trade of the United States in papermaking material in September was the heavy arrivals of rag stock. Probably a new high record of rag imports was established during the month; certainly incoming supplies were larger than in many months and apparently in excess of the amount imported in any single month during the present year of large rag imports. Most of the supply brought in, it is understood, is low grades of rags for roofing felt mills. Late reports from Europe say that the heavy movement of rags to the United States in recent months has greatly decreased stocks on the other side of the Atlantic, which is reflected by the stiffer prices demanded by European dealers. Imports of old rope in September were fair, and some lots of bagging and miscellaneous paper stock were received.

Receipts through the port of New York in September follow:

Old Rope

Brown Bros. & Co., 352 coils from Rotterdam, 579 coils and 21 bls. from Hull, 261 coils from Bristol and 53 coils from Christiania; S. Cohen, 6 bls. from Havana; E. J. Keller Co., 125 coils from Hamburg; R. Servernini, 12 bls. from Santiago; F. P. Gaskell & Co., 10 bls. from Hamburg; Ellerman Wilson S. S. Line, 33 coils from Southhampton and 52 bls. from London; M. Wolfer & Co., 11 bls. from Havana; N. E. Berzen, 27 bls. from Havana; N. Caragol & Son, 8 coils from Marseilles; International Purchasing Co., 109 bls. from Algiers; R. F. Downing & Co., 498 bls. from Barcelona; W. Schall & Co., 55 bls. from Barcelona; Chemical National Bank, 73 coils from Bremen; Order, 28 coils from London, 54 coils from Hamburg and 138 coils from Rotterdam.

Old Bagging

George W. Millar & Co., 88 bls. from Rotterdam; Equitable Trust Co., 110 bls. from Manchester; Mechanics & Metals National Bank, 198 bls. from Manchester, 41 bls. from Glasgow and 212 bls. from Havre; E. J. Keller Co., 91 bls. from Hamburg; Maurice O'Meara Co., 121 bls. from Antwerp; American Woodpulp Corp., 17 bls. from Rotterdam; E. Butterworth & Co., 101 bls. from Antwerp; British Bank of South America, 74 bls. from Liverpool; Order, 18 bls. from Liverpool.

Rags

American Woodpulp Corp., 1,248 bls. from Rotterdam and 595 bls. from Antwerp; Waste Material Trading Corp., 863 bls. from Rotterdam; Katzenstein & Keene, 646 bls. from Rotterdam, 176 bls. from Bremen and 258 bls. from Antwerp; E. J. Keller Co., 549 bls. from Rotterdam, 204 bls. from Antwerp, 477 bls. from Hamburg, 354 bls. from Marseilles and 237 bls. from Havre; S. Silberman Co., 592 bls. from Rotterdam; M. Wolfer & Co., 17 bls. from Havana; Salomon Bros. & Co., 214 bls. from Hull; F. P. Gaskell & Co., 4 bls. from Hamburg and 233 bls. from Bremen; Castle, Gottheil & Overton, 122 bls.

GROUND WOOD
CHEMICAL PULPS
PERKINS-GOODWIN CO.
NEW YORK
PAPER

"MICHIGAN" Combination Steel and Wood Pipe

LONG DISTANCE CONVEYOR OF WATER AND PAPER STOCK IN PAPER AND PULP MILLS—Specially Adapted to Carry Sulphite, Ground Wood and "White Water"

Eighteen reasons why you should use "Michigan" combination steel and wood pipe

1—Durability of Wood Shell. 2—Sanitary. 3—20% more capacity than Cast Iron Pipe. 4—Simplicity in handling. 5—Light in weight. 6—Speed in laying. 7—Protects against freezing. 8—Not affected by Electrolysis. 9—Rigid inspection of materials. 10—Efficient construction of stave. 11—Strength of steel banding. 12—Protection of banding with asphalt coating. 13—Cannot burst under pressure. 14—Can be laid in a wet trench. 15—Short curves without specials. 16—Low installation and maintenance cost. 17—Responsibility of company. 18—Not affected by sulphur or chemical solutions.

THE MICHIGAN PIPE COMPANY
Dept. 17 BAY CITY, MICHIGAN

New York City, N. Y.....17 East 42nd St.
Oklahoma City, Okla.....105 West 16th St.
Chicago, Ill.....Leiter Bldg., 15 East Van Buren St.
Boston, Mass.....Room 737, Oliver Bldg.
Cleveland, Ohio.....919 Ulmer Bldg.
Chattanooga, Tenn.....702 James Bldg.
Philadelphia, Pa.....318 Widener Bldg.
Pittsburgh, Pa.....323 Fulton Bldg.

"Steel for Strength—Wood for Durability"

from Bordeaux and 68 bls. from Antwerp; Albion Trading Co., 59 bls. from Bordeaux and 24 bls. from London; Paul Berlowitz, 383 bls. from Rotterdam; G. M. Graves Co., 29 bls. from London; Atlantic Waste Material Co., 17 bls. from London; Parsons & Whittemore, 225 bls. from Rotterdam; American Exchange National Bank, 377 bls. from Bremen and 469 bls. from Hamburg; Battery Park National Bank, 176 bls. from London; Strathmore Paper Co., 18 bls. from Havre; Goldman, Sachs & Co., 162 bls. from Hamburg; R. F. Downing & Co., 125 bls. from Manchester and 204 bls. from London; W. Brandt's Sons & Co., 48 bls. from Bordeaux; W. Schall & Co., 602 bls. from Bordeaux, 740 bls. from Havre and 287 bls. from Antwerp; First National Bank of Boston, 68 bls. from Havre; Coal & Iron National Bank, 318 bls. from Glasgow; International Acceptance Bank, 391 bls. from Hamburg, 103 bls. from Bremen and 129 bls. from Rotterdam; Mechanics & Metals National Bank, 1,654 bls. from Havre, 987 bls. from Hamburg, 350 bls. from Antwerp, 188 bls. from Manchester and 129 bls. from London; Guaranty Trust Co., 602 bls. from Manchester; National City Bank, 77 bls. from Hamburg; State Bank of New York, 73 bls. from Hamburg; Irving National Bank, 15 bls. from Hamburg and 133 bls. from Copenhagen; Chase National Bank, 79 bls. from Hamburg; Compagnie Generale Transatlantique, 339 bls. from Havre; R. Angles, 45 bls. from Havre; A. Hurst & Co., 114 bls. from Antwerp; Export and Commission Handel, 138 bls. from Antwerp; Brown Bros. & Co., 309 bls. from Middlesborough; Equitable Trust Co., 489 bls. from Havre; Chemical National Bank, 389 bls. from Bremen; Order, 286 bls. from Havre, 58 bls. from London, 1,000 bls. from Hamburg, 495 bls. from Antwerp, 31 bls. from Bordeaux, 775 bls. from Liverpool and 23 bls. from Glasgow.

Miscellaneous Paper Stock

Equitable Trust Co., 255 bls. from London, 1,182 bls. from Liverpool and 30 bls. from Antwerp; Salomon Bros. & Co., 65 bls. from Antwerp; E. Butterworth & Co., 120 bls. from Rotterdam; G. M. Graves & Co., 113 bls. from Liverpool; J. M. Jaffe, 5 bls. from Glasgow; Irving National Bank, 488 bls. from Antwerp; American Exchange National Bank, 25 bls. from Antwerp; Wilkinson Bros. & Co., 38 bls. from Glasgow; Ladenburg, Thalman & Co., 215 bls. from Antwerp; Order, 285 bls. from Havre, 170 bls. from Glasgow and 118 bls. from Antwerp.

Paper

Larger arrivals of wrapping paper from the Scandinavian countries and Germany and a decrease in receipts of newsprint were the features of the import paper trade of the United States in September. Several steamers reached New York during the month with big cargoes of kraft wrapping paper, and a survey of the vessels' manifests shows the names of many of the largest paper jobbing houses in the trade, indicating that numerous dealers are finding it profitable to import wrapping paper. Cigarette paper arrivals were fairly large, and there were the usual amounts of hanging, filter, drawing and writing paper imported. Arrivals at the port of New York in September follows:

Cigarette

Rose & Frank Co., 81 cs. from Havre and 67 cs. from Southampton; American Tobacco Co., 600 cs. from Bordeaux; British-American Tobacco Co., 169 cs. from Liverpool; M. Spiegel & Sons Co., 36 bls. from Genoa; R. J. Reynolds Tobacco Co., 520 cs. from St. Nazaire; De Manduit Paper Co., 267 cs. from St. Nazaire; P. J. Schweitzer, 155 cs. from Marseilles; Surbrug Co., 17 cs. from Havre; Southern Pacific Co., 3 cs. from Havre.

Printing

National City Bank, 185 rolls from Hamburg and 3 cs. from Bremen; M. G. Lange & Co., 198 cs. from Bremen; Perkins-Goodwin Co., 18 cs. from Genoa; P. C. Zulke, 262 cs. from Antwerp and 11 cs. from Hamburg; B. F. Drakenfeld & Co., 65 cs. from Liverpool; W. F. Etherington & Sons, 177 cs. from Glasgow; Oxford University Press, 12 cs. from Liverpool, P. Puttmann, 102 cs. from Antwerp; New York Tribune, 426 rolls from Bremen and 192 rolls from Helsingfors; F. A. Munsey & Co., 158 rolls from Gothenburg; C. L. Robinson, 182 rolls from Gothenburg; H. Lips, 85 cs. from Antwerp; P. E. Vernon & Co., 114 rolls from Helsingfors; New York American, 4,562 rolls from Hallstavik; H. Reeve Angell & Co., 217 rolls from Bremen and 55 rolls from Helsingfors; J. B. Harris & Co., 148 rolls from Bremen and 23 rolls from Helsingfors; C. H. Young Publishing Co., 34 rolls from Bremen; Vernon Bros. Co., 17 bls. from Liverpool; Box Board & Lining Co., 119 rolls from Helsingfors; Virginia Paper Co., 304 rolls from Helsingfors; Paper House of Pennsylvania, 106 rolls from Helsingfors; Hano-Weinkrantz Co., 37 rolls from Helsingfors; Chem-

HANS LAGERLOEF, President and Treasurer
ORVAR HYLIN, Vice President
MAURICE LONDON, Secretary

TRADE HL MARK
REGISTERED

Lagerloef Trading Co., Inc.

52 Vanderbilt Avenue
NEW YORK, N. Y.

Telephones
Murray Hill { 4246 / 4247

WOOD PULP

SOLE AGENTS IN U. S. A., CANADA, MEXICO AND CUBA FOR

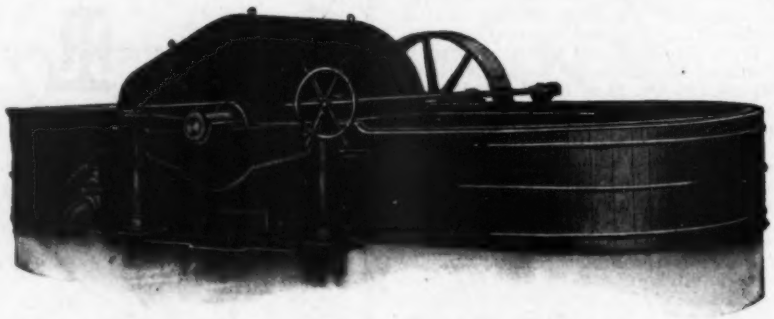
Finnish Cellulose Association
Helsingfors, Finland

AND

Finnish Wood Pulp Union
Helsingfors, Finland

E. D. JONES & SONS CO.

PITTSFIELD, MASS.



Beating Engine, Tub of Iron or Wood

Manufacturers of

Paper Making Machinery

Holyoke Machine Co. HOLYOKE MASS.

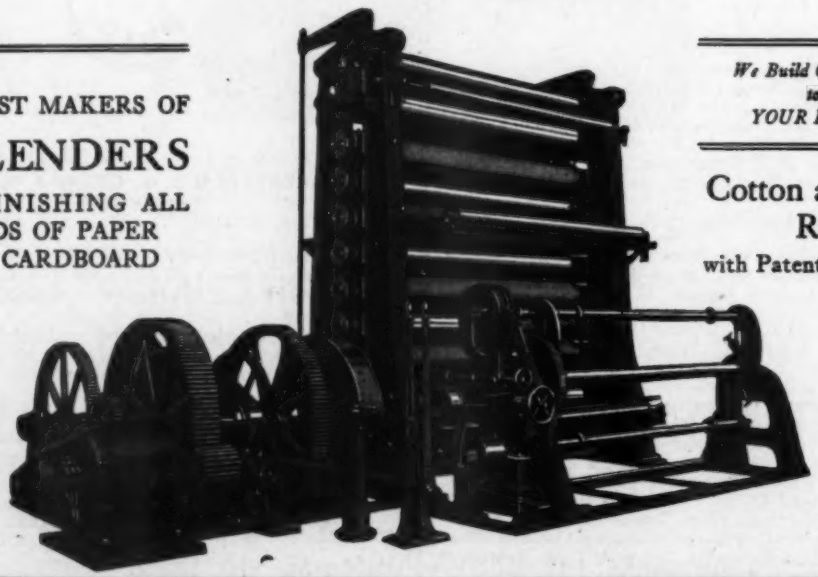
MAKERS OF

Improved Machinery for Wood Pulp, Paper Mills, Paper Converters, Printers and Lithographers

LARGEST MAKERS OF

CALENDERS

FOR FINISHING ALL KINDS OF PAPER *and* CARDBOARD



We Build Our Machinery to Meet YOUR Requirements

Cotton and Paper Rolls

with Patented Fastenings

ical National Bank, 96 rolls from Hamburg; Equitable Trust Co., 61 bls. from Copenhagen; Order, 74 rolls from Christiania, 157 rolls from Helsingfors and 528 rolls from Copenhagen.

Wrapping

Wilkinson Bros. & Co., 93 bls. from Hamburg, 89 bls. and 28 rolls from Rotterdam, 1,426 rolls from Copenhagen, 244 bls. and 479 rolls from Gothenburg, 214 bls. from Bergen, and 465 rolls and 8 bls. from Harnosands; First National Bank of Boston, 2,197 bls. and 3,026 rolls from Hamburg; Republic Bag & Paper Co., 1,477 rolls from Hamburg, 4,768 rolls from Gothenburg and 907 rolls from Harnosands, etc.

Hanging

W. H. S. Lloyd & Co., 19 bls. from London and 3 cs. from Liverpool; Atlantic Forwarding Co., 2 cs. from Havre; A. Murphy & Co., 2 bls. from Liverpool; A. C. Dodman, Jr., & Co., 29 bls. from Liverpool, 4 cs. from Southampton and 6 bls. from Antwerp; F. G. Prager & Co., 7,158 rolls from Antwerp; Bernard Judae & Co., 20 bls. from Hamburg; D. V. Arguimbau, 7 bls. from Havre; R. F. Downing & Co., 18 cs. from Yokohama and 3 bls. from London; J. W. Hampton Jr. & Co., 240 bls. from Hamburg.

Writing

A. Murphy & Co., 1 cs. from Genoa; J. W. Hampton Jr. & Co., 46 cs. from Hamburg; Lunham & Moore, 4 cs. from Southampton and 8 cs. from London; F. L. Karemer & Co., 5 cs. from London; H. W. Robinson & Co., 2 cs. from Liverpool; L. DeJonge & Co., 20 cs. from Marseilles; Defiance Mfg. Co., 8 cs. from Marseilles; E. Deitzgen & Co., 19 cs. from Marseilles; Coenca-Morrison Co., 6 cs. from Havre.

Drawing

Keuffel & Esser Co., 71 cs. from Hamburg; E. Dietzgen & Co., 16 cs. from Hamburg; American Shipping Co., 31 cs. from Hamburg; E. H. Krug Weaving Co., 8 cs. from Antwerp; Lunham & Moore, 19 cs. from London; Favor, Ruhl & Co., 7 cs. from London.

Filter

J. Hanheimer, 93 bls. from Havre; A. Giese & Son, 2 cs. from Hamburg and 25 bls. from Bordeaux; E. Fougera & Co., 84 cs. from Southampton; H. Reeve Angell & Co., 6 cs. from Antwerp; Lunham & Moore, 29 cs. from London; Bernard, Judae & Co., 7 cs. from Gothenburg.

Tissue

Meadows, Wye & Co., 16 cs. from Liverpool; C. H. Wyman Shipping Co., 7 cs. from Liverpool; J. W. Hampton Jr. & Co., 38 cs. from Hamburg; Globe Shipping Co., 38 cs. from Rotterdam; Normann, Schutte & Co., 5 cs. from Genoa.

Photo

Gevaert Co. of America, 56 cs. from Antwerp; Gallagher & Ascher, 2 cs. from Antwerp; Defender Photo Supply Co., 40 cs. from Antwerp.

Boards

Bendix Paper Co., 95 cs. from Hamburg; Metropolitan Import & Mfg. Co., 51 cs. from Hamburg; Knauth, Nachod & Kuhne, 3 cs. from Bremen; Wiebush Calendar Importing Co., 32 cs. from Hamburg; Manufacturers Trust Co., 6 cs. from Hamburg; Bernard, Judae & Co., 2 cs. from Hamburg; H. Maillard, 12 cs. from Havre and 5 cs. from Southhampton; Foreign Paper Mills, 5 cs. from Rotterdam; F. G. Prager & Co., 16 cs. from Hamburg; W. Schall & Co., 6 cs. from Hamburg; U. S. Forwarding Co., 4 cs. from Bremen; State Bank, 9 cs. from Antwerp; Happel & McAvoy, 5 cs. from Bremen; C. B. Richard & Co., 3 cs. from Bremen; A. Vinigck, 222 rolls from Rotterdam; International Forwarding Co., 23 cs. from Hamburg; Italian Book Co., 2 cs. from Hamburg; H. Bainbridge & Co., 2 cs. from London; Order, 312 rolls from Rotterdam, 52 cs. from Hamburg and 4 cs. from Bremen.

Miscellaneous

R. Cushman & Co., 3 cs. from Genoa; Borden-Riley Paper Co., 5 cs. from Antwerp; Phoenix Shipping Co., 8 cs. from Hamburg and 6 cs. from Rotterdam; C. B. Richard & Co., 42 bls. from Hamburg; Whiting-Patterson Co., 12 cs. from Havre; P. C. Kuyper & Co., 5 cs. from Havre; P. H. Petry & Co., 7 cs. from Hamburg; G. W. Sheldon & Co., 19 cs. from Hamburg, 4 cs. from Bremen and 3 cs. from London; Kupfer Bros. Co., 9 rolls from Antwerp; Coenca-Morrison Co., 38 cs. from Hamburg; H. W. Robinson & Co., 10 cs. from Hamburg; Birn & Wachenheim, 36 cs. from Havre; Independent Forwarding Co., 14 cs. from Havre; R. F. Downing & Co., 57 rolls and 33 bls. from Barcelona; Van Oppen & Co., 3 cs. from Genoa; J. Victori & Co., 2 cs. from Hamburg, etc.

J. ANDERSEN & CO.
21 East 40th Street, New York City

Importers of Chemical Pulps
BLEACHED AND UNBLEACHED

Agents for Kellner Partington Paper Pulp Co., Ltd.
Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden

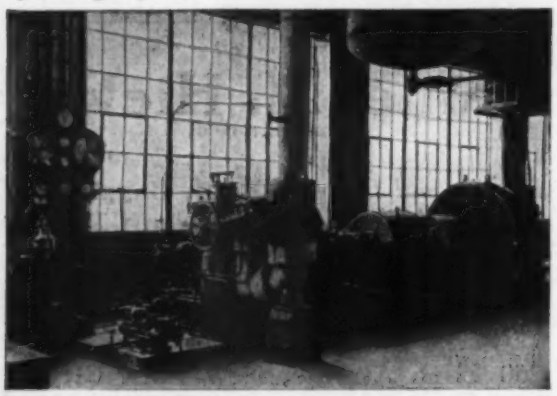
ESTABLISHED 1895
Daniel M. Hicks
INCORPORATED
Foreign and Domestic **Rags, Bagging, Rope and Waste Paper, Pulps, Wires, Chemicals, etc.**
IMPORTERS —— *DEALERS*
200 Fifth Avenue, New York City

E. J. KELLER COMPANY
INCORPORATED
200 FIFTH AVENUE
NEW YORK
FOREIGN AND DOMESTIC
PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
COTTON, JUTE AND FLAX WASTES
EAST INDIA MERCHANDISE

The Pulp and Paper Trading Co.
21 East 40th Street New York City
DEALERS IN DOMESTIC CHEMICAL AND MECHANICAL PULPS AND PAPER
AGENTS FOR
J. & J. Rogers Company, Ausable Forks, N. Y.
Ware Coated Paper Company, Ware, Mass.
E. B. Eddy Company, Ltd., Hull, Canada
Canadian Kraft Limited, Three Rivers, Canada
Dealers in Wayagamack Kraft Pulp
Howard Smith Paper Mills, Montreal, Quebec
EASTERN AGENTS of Sulphite Pulp. Made by
Port Huron Sulphite & Paper Co., Port Huron, Mich.

De Laval Direct Current Generators for Paper Mill Drive

DIRECT CURRENT generators have advantages wherever a wide range of speed adjustment is desirable. For supplying direct current two methods are available, either turbine driven direct current generators may be used or the current may be obtained from an alternating current distribution system by means of rotary converters or motor generators. The production of direct current by turbine driven generators is the most economical of steam, as well as most simple and lowest in first cost and operating expense.



The photograph shows a De Laval 600 K. W. geared turbine direct current generating set supplying current for the operation of a paper machine. Each set of rolls is driven by an individual motor, the speed of which can be adjusted independently of the other motors, so that each set of rolls can be run at the correct speed to take up the "draw" of the paper. The speed of the turbine is held within close limits by an oil relay governor, but the voltage can be adjusted by varying the excitation. There is, of course, no cyclical speed variation, as with a reciprocating engine.

De Laval steam turbines are built with velocity stages for small and medium size units where the exhaust can be used in heating, drying or other processes. Where high efficiency is desired and for large sizes pressure stage turbines are used. They may be designed for back pressure, bleeder, mixed flow or vacuum service.

By means of the De Laval speed reducing gears, De Laval turbines are adapted for driving all classes of machinery, for rope and belt drive, and for direct connection to shafting.

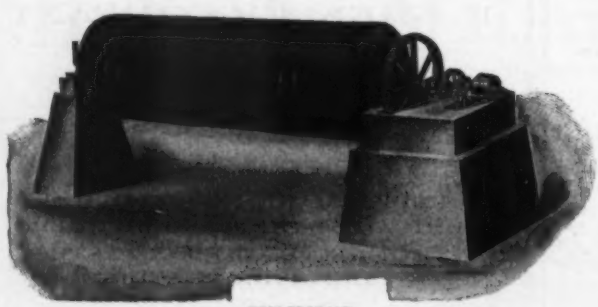
Our Engineering Department will gladly study your pump and power requirements with a view to suggesting the most economical and suitable equipment and arrangement.

De Laval Steam Turbine Co.

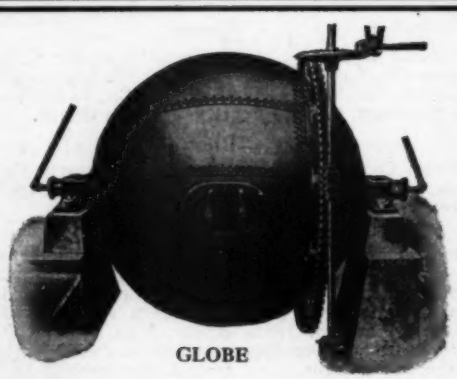
Trenton, N. J.

LOCAL OFFICES: Boston, New York, Philadelphia, Pittsburgh, Cleveland, Indianapolis, Chicago, Duluth, Kansas City, Denver, Salt Lake City, Charlotte, Atlanta, Birmingham, New Orleans, Dallas, Seattle, San Francisco, Los Angeles, Montreal, Toronto, Vancouver.

232



CYLINDER



GLOBE

Biggs Margin of Safety

Biggs Globe and Cylinder Rotary Bleaching Boilers are made to withstand working pressures greatly in excess of those required in every-day service. They have ample margin of safety to resist chemical action and corrosion from lime, soda ash, etc.

"Biggs Rotaries" cover the whole range of paper mill output. Profit by Biggs' long experience studying and solving paper plant engineering problems.

Biggs equipment in practically every important paper plant in the country; repeat orders for "Biggs" again and again whenever new Rotary Boilers are needed: doesn't that suggest merit that's worth your while to investigate? Many installations have been in constant service for over twenty-five years with practically no expense for upkeep. Full particulars gladly mailed at your request.

The Biggs Boiler Works Co. Akron Ohio

THE BIGGS BOILER WORKS COMPANY

Seneca Place and Case Avenue

Akron, Ohio

Buyers' Guide—What and Where to Buy

ADHESIVES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.
ACID RESISTING BRONZE
Eastwood Wire Mfg. Co., Belleville, N. J.
William A. Hardy & Sons, Fitchburg, Mass.
ACID RESISTING PAINT
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
AGITATOR EQUIPMENT
Moore & White Co., Philadelphia, Pa.
AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.
ALKALI
Diamond Alkali Co., Pittsburgh, Pa.
Wing & Evans, 22 William St., N. Y. C.
ANGLE VALVES
The Crane Company, Chicago, Ill.
Eastwood Wire Mfg. Co., Belleville, N. J.
ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago.
Ferguson Engineers, First National Bank Bldg., Chicago.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.
V. D. Simons, 39 S. La Salle St., Chicago.
Jos. H. Wallace & Co., Temple Ct. Bldg., New York City.
ASH CONVEYORS
Green Eng. Co., East Chicago, Ind.
ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.
BABBITT METAL
The Paul R. Brown Co., New York City
BAKELITE GEARS
D. O. James Mfg. Co., Chicago.
BALL CHECK VALVES
The Draper Mfg. Co., Port Huron, Mich.
BALLS (Brass)
The Draper Mfg. Co., Port Huron, Mich.
BALLS (Iron and Steel)
The Draper Mfg. Co., Port Huron, Mich.
BANDLESS ROLLS
Valley Iron Works Co., Appleton, Wis.
BARKERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.
BEARINGS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.
BEARINGS (Ball)
S. K. F. Industries, 165 Broadway, New York.
BEATER BARS (Bronze)
American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.
BEATER ROLL FILLING
Taylor Wharton Iron & Steel Co., Highbridge, N. J.
BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co., Dayton, Ohio.
Holyoke Machine Co., Holyoke, Mass.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
BEATERS (Continuous)
Claflin Engineering Co., Lancaster, Ohio.
BELT DRIVES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
The Link Belt Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
T. B. Wood's Sons Co., Chambersburg, Pa.
BELTING (Rubber)
B. F. Goodrich Rubber Co., Akron, O.
BELTING (Silent Chain)
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
BELT LACING
Flexible Steel Lacing Co., 4875 Lexington St., Chicago.
BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.
BLEACHING POWDER
Pennsylvania Salt Mfg. Co., Philadelphia.
BLEACHING (Propellers)
Moore and White Co., Philadelphia, Pa.
BLOWERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.
BLOW-OFF VALVES
Henry Horkman, Neenah, Wis.
BOARD MACHINES
Beloit Iron Works, Beloit, Wis.
Black-Clawson, Hamilton, Ohio.
Valley Iron Works, Appleton, Wis.
BOILERS
J. F. Davis, Chicago.
BOILERS (Electric)
Electric Furnace Con. Co., Philadelphia, Pa.
BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.
BRICK AND CONCRETE PAINT
Detroit Graphite Co., Detroit, Mich.
BRIMSTONE
Union Sulphur Co., 17 Battery Place, New York City.
BRONZE CASTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.
BUCKETS (Elevator)
Hendrick Mfg. Co., Carbondale, Pa.
CALENDERS
Beloit Iron Works, Beloit, Wis.
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.
Smith & Winchester Mfg. Co., So. Windham, Conn.
CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N.Y.
CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.
CASEIN
Casein Mfg. Co., New York City.
CASTINGS (Iron & Brass)
Smith & Winchester Mfg. Co., So. Windham, Conn.
CASTINGS (Brass and Bronze)
Eastwood Wire Mfg. Co., Belleville, N. J.
CASTINGS (Grey Iron)
Nordberg Mfg. Co., Milwaukee, Wis.
CAUSTIC SODA
Diamond Alkali Co., Pittsburgh, Pa.
Edw. Hill's Son & Co., New York City
Wing & Evans, Inc., 22 Williams St., New York.
CEMENT
Smith & Winchester Mfg. Co., So. Windham, Conn.
CEMENT PAINT
Detroit Graphite Co., Detroit, Mich.
CENTRIFUGAL PUMPS
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
E. M. Cross Mach. Co., Berlin, N. H.
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
CHAIN DRIVES
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
CHAIN GRATES
Green Eng. Co., East Chicago, Ind.
CHEMICALS
Diamond Alkali Co., Pittsburgh, Pa.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., New York City.
Wing & Evans, Inc., 22 Williams St., New York.
CHIMNEYS (Metal)
Littleford Bros., Cincinnati, O.
CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.
CLAYS AND FILLERS
Daniel M. Hicks, 200 Fifth Ave., New York City.
COAL BUNKERS
The Brownhoist Co., Cleveland, Ohio.
COAL CRUSHERS
Orton & Steinbrenner Co., Chicago, Ill.
COAL & ASH HANDLING SYSTEMS
Link Belt Co., Chicago.
COATED PAPERS
Watervliet Paper Co., Watervliet, Mich.
CONCRETE FLOOR HARDENER
Detroit Graphite Co., Detroit, Mich.
CONCRETE PAINT
Detroit Graphite Co., Detroit, Mich.
CONDENSERS
Nordberg Mfg. Co., Milwaukee, Wis.
CONSULTING ENGINEERS
James L. Carey, 208 N. Laramie St., Chicago, Ill.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
Ferguson Engineers, First National Bank Bldg., Chicago.
George F. Hardy, 309 Broadway, New York City
V. D. Simons, 39 S. La Salle St., Chicago.
Jos. H. Wallace & Co., Temple Ct. Bldg., New York City.
CONSULTING ENGINEERS (Power)
B. M. Baxter, Kirby Bldg., Cleveland.
V. D. Simons, 39 S. La Salle St., Chicago.
CONTRACTORS (Building)
The Austin Co., Cleveland, O.
CONVEYORS
Link-Belt Co., Chicago, Ill.
CORES (Collapsible)
Smith & Winchester Mfg. Co., So. Windham, Conn.
CORLISS ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.
COUNTERS (Revolution)
The Foxboro Co., Inc., Foxboro, Mass.
COUPLINGS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
COUPLINGS (Shaft)
T. B. Wood's Sons Co., Chambersburg, Pa.
CRANES (Auto)
The Byers Mach. Co., Ravenna, O.
CRANES (Crawling Tractor)
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago.
CRANES (Dipper Arm)
Industrial Works Bay City, Mich.
Orton & Steinbrenner Co., Chicago, Ill.
CRANES (Locomotive)
Brownhoist Co., Cleveland, O.
Link Belt Co., Chicago.
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago, Ill.
CRANES (Overhead)
Northern Engineering Works, Detroit, Mich
CREOSOTING CYLINDERS
Biggs Boiler Works Co., Akron, O.
CUTTERS
Smith & Winchester Mfg. Co., So. Windham, Conn.
CYLINDER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.
CYLINDER MOLDS (New or Repaired)
Appleton Wire Works, Appleton, Wis.
Beloit Iron Works, Beloit, Wis.
Cheney Bigelow Wire Works, Springfield, Mass
Eastwood Wire Mfg. Co., Belleville, N. J.
Glens Falls Machine Works, Glens Falls, N. Y
The Lindsay Wire Weaving Co., Cleveland, O
The W. S. Tyler Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.
DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.
DIE PRESSES
Smith & Winchester Mfg. Co., So. Windham, Conn.
DIESEL ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.
DIGESTERS
The Biggs Boiler Works Co., Akron, O
Chicago Bridge & Iron Wks., Chicago, Ill.
Manitowoc Eng. Works, Manitowoc, Wis.
DIGESTER COVERS
Eastwood Wire Mfg. Co., Belleville, N. J.
DRAFT GAUGES
The Foxboro Co., Foxboro, Mass.
DRUM WINDERS (Drives)
Beloit Iron Works, Beloit, Wis.
Ticonderoga Machine Co., Ticonderoga, N. Y
DRYERS
Smith & Winchester Mfg. Co., So. Windham, Conn.
DRYERS (Roller)
The Coe Manufacturing Co., Painesville, O.
DRYERS (Rotary)
Biggs Boiler Works Co., Akron, O.
DRYER EXHAUST
Nash Engineering Co., So. Norwalk, Conn.
DRYER FELTS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons.
Lockport Felt Co., Lockport, N. Y.
Shuler and Benninghofen, Hamilton, Ohio.
DRYING MACHINES
The H. P. Coe Drying Mach. Corp., N. Y. C.
DYESTUFFS
E. I. Du Pont de Nemours & Co., Wilmington, Del.
H. A. Metz & Co., Inc., 122 Hudson St., New York City.
National Aniline & Chem. Co., New York City.
The Newport Chemical Works, Inc., Passaic, N. J.
Standard Ultramarine Co., Huntington, W. Va.
Sandoz Chemical Works, 238 Water St., New York City.
The White Tar Aniline Corp., 56 Vesey St., New York City.
DUST COLLECTING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
ELECTRIC HOISTS
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.
ELECTRIC STEAM GENERATORS AND BOILERS
Electric Furnace Construction Co., Philadelphia, Pa.
ELECTRICAL MACHINERY
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
ELEVATORS
Link Belt Co., Chicago
ENGINES
American Blower Co., Detroit, Mich.
The Brownell Co., Dayton, O.
ENGINEERS
B. M. Baxter, 5716 Euclid Ave., Cleveland, O.
James L. Carey, 208 North Laramie St., Chicago, Ill.
George F. Hardy, 309 Brodway, New York City.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
Ferguson Engineers, First National Bank Bldg., Chicago.

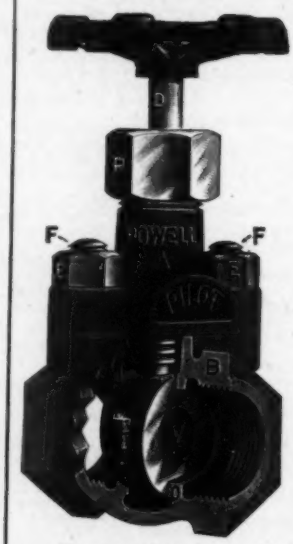
"ELECTRO" STEAM BOILER
(Kaelin Development)
100 KVA (10 B.H.P.) to 34,000 KVA (3400 B.H.P.) in daily use.
Larger or smaller units supplied.
ELECTRIC FURNACE CONSTRUCTION COMPANY
908 Chestnut St. Philadelphia, Pa.

Nothing Needed But a Hammer
ALLIGATOR
TRADE MARK REG. U.S. PAT. OFFICE
STEEL BELT LACING
Ask Your Belting Supply House or Write Us for Prices and Samples.
Reg. U.S. Pat. Off.
Send for Valuable FREE Book
The Strongest Belt Lacing on Earth
Never Lets Go
FLEXIBLE STEEL LACING CO., 4675 Lexington St., Chicago, Ill.

NORTHERN CRANES
NORTHERN ENGINEERING WORKS
DETROIT, MICH., U.S.A.

Steel Plate Construction
Steel Storage Tanks, Blast Furnaces, Gas Holders
Steel River Barges and Plate Work of all Kinds
Steel Transmission Towers
RITER-CONLEY COMPANY
General Offices, Pittsburgh, Pa.

POWELL VALVES
"Pilot" Gate Valves



All iron or iron body with steam bronze trimmings. Simple in construction.

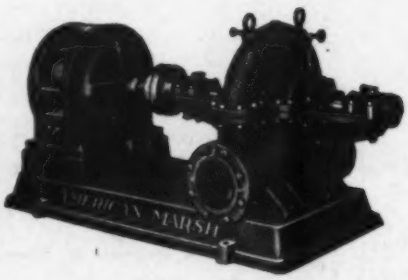
Economical and Reliable

Avoid disappointment in Valve Service by specifying POWELL VALVES

THE WM. POWELL CO
Cincinnati, Ohio

Write for descriptive Circular

American-Marsh Paper Mill Pumps
Centrifugal and Direct Acting

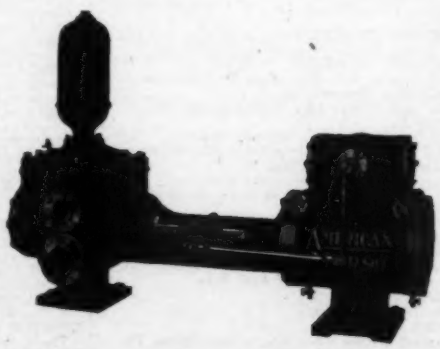


ESPECIALLY adapted for paper mill service where absolute reliability and high efficiency are required. There is an American-Marsh pump for every paper mill requirement, from draining the rolls on the dryers to handling heavy paper pulp stock.

Because of the fact that the factory is located in the heart of the largest paper mill district in the world, we have always made a specialty of paper mill pumps and our designs are the result of careful first hand study of the actual requirements.

The line includes

Boiler Feed Pumps
Centrifugal Pumps
Stock Pumps
Deep Well Engines
Jet Condensers
Air Compressors
Vacuum Pumps
Power Pumps



May we send you our general catalog?

American Steam Pump Company
Battle Creek, Michigan

Buyers' Guide—What and Where to Buy

V. D. Simons, 39 S. La Salle St., Chicago.
Stebbins Engineering & Mfg. Co., Watertown, N. Y.
Jos. H. Wallace & Co., Temple Ct. Bldg., New York City.

ENGINEERS (Structural)
The Austin Co., Cleveland, O.

EVAPORATORS:
Swenson Evaporator Co., Chicago, Ill.

EXHAUSTERS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

FELTS AND JACKETS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Newfane, N. Y.
Shuler and Benninghofen, Hamilton, Ohio
Waterbury Felt Co., Skaneateles Falls, N. Y.

FELT AND WIRE GUIDES
Moore & White Co., Philadelphia, Pa.

FILTER (Continuous Suction)
Oliver Continuous Filter Co., Los Angeles, Calif.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc., Clayton, N. J.
Norwood Eng. Co., Florence, Mass.
The Permutit Co., 440 Fourth Ave., N. Y. C.

FLAT WALL PAINT
Detroit Graphite Co., Detroit, Mich.
The Franklin Paint Co., Cleveland, O.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

FLUID METERS
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

FLY BARS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

FOURDRINIER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

FRICTION CLUTCHES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Moore and White Co., Philadelphia, Pa.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
T. B. Wood's Sons Co., Chambersburg, Pa.

FUSE PLUGS
Federal Electric Co., Chicago, Ill.

FUSE WIRE
Federal Electric Co., Chicago, Ill.

FUSES (Cartridge)
Federal Electric Co., Chicago, Ill.

GAUGES (Pressure)
The Foxboro Co., Inc., Foxboro, Mass.

GAUGES (Liquid Level)
The Foxboro Co., Inc., Foxboro, Mass.

GEARS
Cleveland Worm Gear Co., Cleveland, O.
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Foote Bros. Gear & Machine Co., 250 N. Curtis St., Chicago, Ill.
D. O. James Mfg. Co., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.

GEARS (Bakelite)
Foote Bros. Gear & Mach. Co., Chicago.

GEARS (Heavy Duty)
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

GEARS (Rawhide)
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

GEARS (Silent Chain)
Morse Chain Co., Ithaca, N. Y.

GEARS (Worm)
Cleveland Worm & Gear Co., Cleveland, O.

GLUES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

GRAB BUCKETS
The Byers Mach. Co., Ravenna, O.
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago, Ill.

GRANITE ROLLS
Jones Bros. Co., Barre, Vt.

GREASE CUPS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Hunter Pressed Steel Co., Lansdale, Pa.

GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Holyoke Machine Co., Holyoke, Mass.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

HAMMERS (Double Acting Steam Pile)
Industrial Works, Bay City, Mich.

HANGERS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

HEAT RESISTING PAINTS
Detroit Graphite Co., Detroit, Mich.
The Franklin Paint Co., Cleveland, O.

HEATERS (Open Steam)
Biggs Boiler Works Co., Akron, O.

HEATING SYSTEMS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
J. O. Ross Engineering Corp., 30 E. 42nd St., N. Y.
Skinner Bros. Co., 1444 S. Vandeventer Ave., St. Louis, Mo.

HOISTS (Electric)
Northern Eng. Works, Detroit, Mich.

HOISTING AND CONVEYING SYSTEMS
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.

HOISTING AND MONORAIL SYSTEMS
Northern Eng. Works, Detroit, Mich.

HOUSE PAINT
Detroit Graphite Co., Detroit, Mich.

HYDRAULIC TURBINES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.

INSTRUMENTS (Fluid Meter)
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

INSTRUMENTS (Recording and Indicating)
The Foxboro Co., Inc., Foxboro, Mass.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Valley Iron Works Co., Appleton, Wis.

IRON FILLER
Detroit Graphite Co., Detroit, Mich.

IRON & STEEL SUPPLIES
Brown-Wales Co., Boston, Mass.

JORDAN ENGINES
Jones & Sons Co., E. D., Pittsfield, Mass.
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Shartle Bros. Machine Co., Middletown, Ohio.

JORDAN FILLINGS
Jones & Sons Co., E. D., Pittsfield, Mass.
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
The Shartle Bros. Mach. Co., Middletown, O.
Taylor Wharton Iron & Steel Co., Highbridge, N. J.

JORDAN FILLINGS (Bronze)
American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.

KETTLES (Steam Jacketed)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

KNIVES
Simonds Mfg. Co., Fitchburg, Mass.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

LABORATORY MACHINERY
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

LAYBOYS
Moore and White Co., Philadelphia, Pa.

LIGHT REFLECTING PAINT
Detroit Graphite Co., Detroit, Mich.

LUBRICATING GRAPHITE
Detroit Graphite Co., Detroit, Mich.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.

MACHINE PAINTS
Detroit Graphite Co., Detroit, Mich.
The Franklin Paint Co., Cleveland, O.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

MECHANICAL PULP
J. Andersen & Co., 21 E. 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

METAL PROTECTING PAINTS
Detroit Graphite Co., Detroit, Mich.

METERS (Fluid)
Bailey Meter Co., 2023 E. 46th St., Cleveland, Ohio.

MILL ARCHITECTS
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

MILL WHITE
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
The Franklin Paint Co., Cleveland, O.

NAVAL STORES
Hercules Powder Co., Wilmington, Del.

OIL CUPS
Hunter Pressed Steel Co., Lansdale, Pa.

OIL STORAGE SYSTEMS
Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago, Ill.

PAINTS
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
The Franklin Paint Co., Cleveland, O.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

PAPER CUTTERS & SLITTERS
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass.
Meisel Press Mfg. Co., Boston, Mass.
Seybold Machine Co., Dayton, Ohio.
Smith & Winchester Mfg. Co., South Windham, Conn.

PAPER EXPORTERS AND IMPORTERS
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.

PAPER MACHINES
Beloit Iron Works, Beloit, Wis.
The Black-Clawson Co., Hamilton, O.
Pusey & Jones Co., Wilmington, Del.
Smith & Winchester Mfg. Co., South Windham, Conn.
Valley Iron Works, Appleton, Wis.

PAPER MACHINE DRIVES
Nordberg Mfg. Co., Milwaukee, Wis.
Westinghouse Elec. & Mach. Co., East Pittsburgh, Pa.

PAPER MANUFACTURERS
Eastern Manufacturing Co., 501 Fifth Ave., N. Y. City.
Hammermill Paper Co., Erie, Pa.
Munising Paper Co., Munising, Mich.
Oxford Paper Co., 200 Fifth Ave., N. Y. City.
Ticonderoga Pulp & Paper Co., New York City.
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Mosinee, Wis.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., 21 East 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.
Diamond Alkali Co., Pittsburgh, Pa.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Mendelson Bros. Paper Stock Co., 910 Michigan Ave., Chicago.
Paper Trading Co., Boston, Mass.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perkins-Goodwin Co., 30 W. 42nd St., N. Y. C.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER TESTERS
Thwing Instrument Co., 3353 Lancaster Ave., Philadelphia, Pa.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

PENSTOCKS
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago, Ill.
Riter-Conley Co., Pittsburgh, Pa.

PERFORATED METALS
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, 57 Fairmount Ave., Jersey City, N. J.

PERFORATORS
Meisel Press Mfg. Co., Boston, Mass.

PILLOW BLOCKS
T. B. Wood's Sons Co., Chambersburg, Pa.

PILE DRIVERS
Industrial Works, Bay City, Mich.

PINIONS
Foote Bros. Gear & Mach. Co., Chicago.

PIPE JOINT CEMENT
Detroit Graphite Co., Detroit, Mich.

PIPE RIVETED STEEL
American Spiral Pipe Works, 14th St. and 48th Ave., Chicago.
Chicago Bridge & Iron Wks., Chicago, Ill.
The Biggs Boiler Works, Akron, O.

PIPING EQUIPMENT
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPE THREADING & CUTTING MACHINERY
Toledo Pipe Threading Machine Co., Toledo, O.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

POWER TRANSMISSION
Dodge Mfg. Co., Mishawaka, Ind.
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Link-Belt Co., Chicago, Ill.
D. O. James Mfg. Co., Chicago, Ill.
A. Plamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.
Valley Iron Works, Williamsport, Pa.
T. B. Wood's Sons Co., Chambersburg, Pa.

PRESERVATIVE PAINTS
Detroit Graphite Co., Detroit, Mich.

PRINTING PRESSES
Meisel Press Mfg. Co., Boston, Mass.

PULLEYS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
J. B. Wood's Sons Co., Chambersburg, Pa.

PULP (Chemical)
J. Andersen & Co., 21 East 40th St., New York City.
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

BALE YOUR PULP

with LAIDLAW BALE TIES. We specialize on this line. WIRE NAILS and WIRE in all sizes for general purposes.

LAIDLAW BALE TIE COMPANY, Ltd.
HAMILTON, CANADA

Equip Your Plant with Robins Belt Conveyors

Belt and Bucket Elevators and Skip Hoists for handling Wood Chips, Coal and Ashes. Write for Handbook of Conveyor Practice.

ROBINS CONVEYING BELT COMPANY

NEW YORK, 14 PARK ROW — BOSTON, 70 KILBY ST.
CHICAGO, OLD COLONY BLDG. — PITTSBURGH, UNION ARCADE BLDG.
El Paso, Texas.....349 First National Bank Bldg.
Birmingham, Ala.....C. B. Davis Engineering Co.
Toronto, Ontario.....Gutta Percha & Rubber, Ltd.
San Francisco.....The Griffin Company

STANDARD BLEACHING POWDER

Manufactured by
Pennsylvania Salt M'f'g Co.
PHILADELPHIA, PA.

The
Hinde & Dauch Paper Co.

Corrugated Fibre Shipping Boxes and Packing Materials of Acknowledged Superiority

Sales offices in principal cities

MAIN OFFICE
SANDUSKY, OHIO

The Sandy Hill Iron & Brass Works

Hudson Falls
New York

Manufacturers of **Paper and Pulp Mill Machinery**

Buyers' Guide—What and Where to Buy

Daniel M. Hicks, 200 Fifth Ave., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.
Price & Pierce, Ltd., 30 East 42nd St., New York City.
The Pulp & Paper Trading Co., 21 East 40th St., New York City.

PULP AND PAPER MILL MACHINERY
Beloit Iron Works, Beloit, Wis.
The Biggs Boiler Works Co., Akron, O.
The Black-Clawson Co., Hamilton, Ohio.
Davis, Frank H., Cambridge, Mass.
Glens Falls Machine Co., Glens Falls, N. Y.
Improved Paper Machinery Co., Nashua, N. H.
Moore & White Co., Philadelphia, Pa.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Noble & Woods Machine Co., Hoosick Falls, N. Y.
Pusey & Jones Co., Wilmington, Del.
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

PULP GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.

PULP PRESSES
Southwork Foundry & Machine Co., Philadelphia, Pa.

PUMPS (Stock)
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.
Glens Falls Machine Co., Glens Falls, N. Y.
Gregg Pump Co., Kansas City, Mo.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Centrifugal)
American Steam Pump Co., Battle Creek, Mich.
Aurora Pump & Mfg. Co., Aurora, Ill.
Buffalo Steam Pump Co., Buffalo, N. Y.
Cross, E. M., Mach. Co., Berlin, N. H.
DeLaval Steam Pump Co., Trenton, N. J.
Fairbanks, Morse & Co., 900 Wabash Ave., Chicago, Ill.
Hayton Pump & Blower Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Deep Well)
Aurora Pump & Mfg. Co., Aurora, Ill.
A. D. Cook & Co., Inc., Lawrenceburg, Ind.
Gregg Pump Co., Kansas City, Mo.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
E. M. Cross Mach. Co., Berlin, N. H.
Nash Eng. Co., South Norwalk, Conn.

RAG AND PAPER DUSTERS
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.

RECLAIMING MACHINERY
Swenson Evaporator Co., Chicago, Ill.

REELS
Smith & Winchester Mfg. Co., So. Windham, Conn.

ROLLS (Rubber Covered)
B. F. Goodrich Co., Akron, Ohio.
Stowe & Woodward Co., Upper Newton Falls, Mass.

ROLLER BEARINGS
S. K. F. Industries, 165 Broadway, N. Y. C.

ROOFS
U. S. Gypsum Co., Wells & Monroe Sts., Chicago, Ill.

ROOF DRYING SYSTEMS
Clarage Fan Co., Kalamazoo, Mich.

ROOF PAINT
Detroit Graphite Co., Detroit, Mich.

ROPE DRIVES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Dodge Mfg. Co., Mishawaka, Ind.
T. B. Wood's Sons Co., Chambersburg, Pa.

ROTARY BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

ROZIN
Hercules Powder Co., Wilmington, Del.

RUST RESISTING PAINT
Detroit Graphite Co., Detroit, Mich.

SAVE-ALLS
Glens Falls Machine Co., Glens Falls, N. Y.

SAWS
Simonds Mfg. Co., Fitchburg, Mass.

SCALES
Fairbanks-Morse & Co., 900 Wabash Ave., Chicago, Ill.

SCREENS
The Bagley & Sewall Co., Watertown, N. Y.
Union Iron Works, Bangor, Me.

SCREENS (Perforated Metal)
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, 57 Fairmount Ave., Jersey City, N. J.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
William A. Hardy & Sons, Fitchburg, Mass.
Union Screen Plate Co., Fitchburg, Mass.

SHAFTING
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

SHOWER PIPES
Smith & Winchester Mfg. Co., So. Windham, Conn.

SHREDDERS
Gruendler Patent Crusher & Pulverizer Co., St. Louis, Mo.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

SIZE
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

SLITTING AND REWINDING MACHINERY
Beloit Iron Works, Beloit, Wis.
Cameron Machine Co., Brooklyn, N. Y.
Hamblet Machine Co., Lawrence, Mass.
Meisel Press Mfg. Co., Boston, Mass.
Samuel M. Langston Co., Camden, N. J.

SMOKE STACKS (Steel)
Chicago Bridge & Iron Wks., Chicago, Ill.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

SOOT BLOWERS
Diamond Power Specialty Corporation, Detroit, Mich.

SODA ASH
Diamond Alkali Co., Pittsburgh, Pa.
Edw. Hill's Son & Co., New York City
Wing & Evans, Inc., 22 Williams St., New York.

SPECIAL MACHINERY
Nordberg Mfg. Co., Milwaukee, Wis.

SPEED CHANGES
Moore and White Co., Philadelphia, Pa.

SPEED REDUCERS
Foote Bros. Gear & Machine Co., 250 N. Curtis St., Chicago, Ill.
D. O. James Mfg. Co., Chicago.

SPEED REDUCTION UNITS
Cleveland Worm & Gear Co., Cleveland, O.
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPEED TRANSFORMERS
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPIRAL GEARS
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPIRAL PIPE
American Spiral Pipe Works, Chicago.

SPRAY NOZZLES
Buffalo Forge Co., Buffalo, N. Y.

SPROCKETS
Morse Chain Co., Ithaca, N. Y.

STEAM GENERATORS, (Electric)
Electric Furnace Con. Co., Philadelphia, Pa.

STEAM TURBINES
Moore Steam Turbine Corp., Wellsville, N. Y.

STEEL PLATE CONSTRUCTION
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.
Riter-Conley Co., Pittsburgh, Pa.

STOCK CIRCULATING SYSTEM
Claflin Engineering Co., Lancaster, Ohio.
Ticonderoga Machine Works, Ticonderoga, N.Y.

STOCK PUMPS
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.

STORAGE TANKS (Steel)
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago, Ill.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.
Riter-Conley Co., Pittsburgh, Pa.

STRAINERS
A. D. Cook, Inc., Lawrenceburg, Ind.

STRUCTURE STEEL PAINT
Detroit Graphite Co., Detroit, Mich.

STUFF CHESTS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

STUFF PUMPS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
De Laval Steam Pump Co., Trenton, N. J.

SUCTION ROLLS
Sandusky Foundry & Machine Co., Sandusky, O.

SULPHITE (Strong Bleached and Easy Bleaching)
The Borregaard Co., Inc., 200 Fifth Ave., New York City.

SULPHITE FITTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.

SULPHITE MACHINERY
The Biggs Boiler Works Co., Akron, O.

SULPHUR
Union Sulphur Co., 17 Battery Place, New York City.

SULPHUR BURNERS
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

SUPERHEATERS
Power Specialty Co., New York City.

TACHOMETERS
The Foxboro Co., Inc., Foxboro, Mass.

TANKS (Iron and Steel)
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Works, Transportation Bldg., Chicago.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

TANKS (Oil)
Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago, Ill.

TANKS (Paint)
Biggs Boiler Works Co., Akron, O.

TANKS (Jacketed)
Biggs Boiler Works Co., Akron, O.

TANKS (Wooden)
Hauser-Stander Tank Co., Cincinnati, O.
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.

TANK PAINT
Detroit Graphite Co., Detroit, Mich.

TANKS AND TOWERS
Chicago Bridge & Iron Works, Transportation Bldg., Chicago.

THERMOMETERS (Recording and Indicating)
The Foxboro Co., Foxboro, Mass.

TRACTORS
The Holt Mfg. Co., Inc., Peoria, Ill.

TRANSMISSION MACHINERY
Dodge Mfg. Co., Mishawaka, Ind.
Foote Bros. Gear & Mach. Co., Chicago.
T. B. Wood's Sons Co., Chambersburg, Pa.
D. O. James Mfg. Co., Chicago.

TURBINE (Steam)
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TURBINES (Hydraulic)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.
A. Piamondon Mfg. Co., 5301 S. Western Ave., Chicago, Ill.

UNIFLOW ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.

VACUUM GAUGES
The Foxboro Co., Foxboro, Mass.

VACUUM PUMPS
The Nash Eng. Co., South Norwalk, Conn.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVE FACING TOOLS
The Draper Mfg. Co., Port Huron, Mich.

VALVES
The Crane Co., Chicago, Ill.
G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, Ill.
Eastwood Wire Mfg. Co., Belleville, N. J.
Jenkins Bros., New York City.
Lunkenheimer Co., The, Cincinnati, O.
The Wm. Powell Co., Cincinnati, Ohio.

VALVES (Digester)
Eastwood Wire Mfg. Co., Belleville, N. J.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., 30 E. 42nd St., New York City.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VARIABLE SPEED ENGINES
The Brownell Co., Dayton, Ohio.

VATS (Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., 453 E. Pearl St., Cincinnati, O.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., 30 E. 42nd St., New York City.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VULCANIZERS
Biggs Boiler Works Co., Akron, O.

WASHER WIRES
Eastwood Wire Mfg. Co., Belleville, N. J.
The W. S. Tyler Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

WASTE PAPER STOCK
Mendelson Bros. Paper Stock Co., 910 S. Michigan Blvd., Chicago, Ill.

WATER FILTER
Glens Falls Machine Co, Glens Falls, N. Y.
Hungerford & Terry, Inc., Clayton, N. J.

WATER-SOFTENING AND PURIFYING SYSTEMS
The Permutit Co., 440 Fourth Ave., N. Y. C.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
Holyoke Machine Co., Holyoke, Mass.
A. Piamondon Mfg. Co., 5301 S. Western Avenue, Chicago, Ill.

WET MACHINES
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

WOOD GRAPPLES
Industrial Works, Bay City, Mich.

WOOD PIPE
The Michigan Pipe Co., Dept. 17, Bay City, Mich.
A. Wyckoff & Son Co., Elmira, N. Y.

WOOD PRESERVATIVES
Detroit Graphite Co., Detroit, Mich.

WORM DRIVES
Cleveland Worm & Gear Co., Cleveland, O.

WORM GEARS
Foote Bros. Gear & Mach. Co., Chicago.

WIRE SIGNS
Cheney Bigelow Wire Works, Springfield, Mass.

The Franklin Paint Company

Manufacturers of

Saveall Liquid Asbestos Roofing

Paints of all kinds, particularly adapted for Paper & Pulp Mill purposes

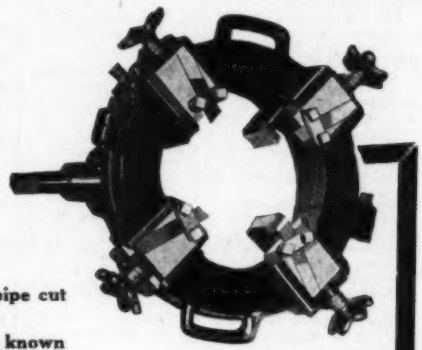
Utility Paint — Cement Floor Paint — Mill White Paint
Smoke Stack Paint—Structural Iron Paint—Interior Tile Enamel

Write for FACTORY PRICES

Main Office and Works: CLEVELAND, OHIO

"TOLEDOS"

ARE REAL PIPE CUTTERS



No longer is it necessary to ream, file and fuss with pipe cut off by inadequate pipe cutters.

For years "Toledo" Pipe Threading Devices have been known as the most efficient threading tools for all pipe up to 12", and today you can secure "Toledo" Pipe Cutters, that are just as efficient for cutting off all pipe up to 12".

Whether it's the "Vosper" for cutting ⅛" to 2", or the "Toledo" No. 250 for 2⅛" to 6", the No. 300 for 4⅛" to 8", the No. 350 for 7" to 10" or the No. 400 for 9" to 12", any one can be taken to the job anywhere and the pipe cut off even tho it be in a line or with fittings on both ends. The sharp, steel cutting knives cut thru the pipe easily, rapidly, leaving a clean, smooth, square-end cut without burrs. "Toledos" are the most efficient pipe cutters in use today, either for hand operation or operated by the "Toledo" Power Drive—the portable electrical power unit.

Ask for a Copy of our Complete Catalog

"TOLEDO"

Insist on this Trade Mark on the Tools and Dies you buy

The Toledo Pipe Threading Machine Co. Toledo, O.

New York Office: 50 Church St.

RETURN TUBULAR LOCOMOTIVE BOILERS WATER TUBE SCOTCH MARINE

A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS — RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE NOW!

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION—LET DAVIS FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE
RANDOLPH 2233

J. F. DAVIS

1122-1123-1124 HARRIS TRUST BUILDING
CHICAGO, ILL.

Alphabetical Index to Our Advertisers

When writing them, please mention The Paper Industry

Allis-Chalmers Co. 964
American Blower Co..... 880
American Spiral Pipe Works..... 968
American Steam Pump Co..... 998
American Manganese Bronze Co..... 973
Anderson & Co., J..... 995
Appleton Wire Works..... 946
Appleton Woolen Mills..... 974
Aurora Pump & Mfg. Co..... 953
Austin Co., The..... 881

Bagley & Sewall Co...Inside Front Cover
Baxter, B. M..... 988
Bayley Mfg. Co..... 963
Beloit Iron Works..... 930
Biggs Boiler Works Co., The..... 996
Black-Clawson Co., The..... 930
Borregaard Co., Inc., The..... 977
Brown Co., The Paul R..... 970
Brown Hoisting Machine Co..... 959
Brown-Wales Co. 988
Brownell Co., The..... 966
Buffalo Forge Co..... 962
Buffalo Steam Pump Co..... 962
Byers Machine Co., The..... 958

Cameron Machine Co..... 907
Carey, James L..... 988
Casein Mfg. Co..... 987
Central Manufacturing Co..... 949
Cheney Bigelow Wire Works..... 976
Chicago Bridge & Iron Works..... 960
Claflin Engineering Co..... 961
Clarage Fan Co..... 934
Cleveland Worm Gear Co., The..... 933
Coe Drying Machine Corp., The H. P.. 888
Coe Manufacturing Co., The..... 961
Cook, A. D., Inc..... 953
Crane Co., The..... 904
Cross Machine Co., E. M..... 947
Cutler-Hammer Mfg. Co..... 929

Davis, Frank H..... 961
Davis, J. F.....1002
Davis Regulator Co., G. M..... 967
Dayton Beater & Hoist Co..... 975
De Laval Steam Turbine Co..... 996
Detroit Graphite Co..... ...
Diamond Alkali Co..... 982
Diamond Power Specialty Corporation 939
Dodge Mfg. Co.....1004
Draper Manufacturing Co., The..... 965
Du Pont de Nemours & Co..... 940

Eastern Manufacturing Co..... 984
Eastwood Wire Mfg. Co..... 945
Electric Furnace Construction Co.... 998
English China Clay Sales Corp.....
.....Front Cover

Fairbanks, Morse Co..... 964
Falls Clutch & Mach. Co., The..... 986
Federal Electric Co..... 970
Ferguson, Hardy S..... 988
Ferguson Engineers 988
Fitchburg Duck Mills..... 943
Foote Bros. Gear & Mach. Co..... 935
Foxboro Co., The..... 937
Flexible Steel Lacing Co..... 998
Franklin Paint Co., The.....1002

Glens Falls Machine Works..... 936
Goodrich Rubber Co., B. F..... 886
Green Bay Foundry & Mach. Co..... 892
Green Engineering Co..... 938
Gregg Pump Co..... 952
Gruendler Patent Crusher & Pulverizer Co. 956

Hamblet Machine Co..... 969
Hammermill Paper Co..... 950
Hardy, Geo. F..... 988
Hardy & Son, Wm. A..... 949
Hauser-Stander Tank Co..... 960
Hayton Pump & Blower Co..... 965
Hendrick Mfg. Co..... 969
Hercules Powder Co..... 987
Hicks, Daniel M..... 995
Hill's Son & Co., Edward..... 982
Hinde & Dauch Paper.....1000
Holt Mfg. Co., Inc., The..... 879
Holyoke Machine Co..... 994
Horkman, Henry 897
Hungerford & Terry, Inc..... 971
Hunter Pressed Steel Co..... 979
Huyck & Sons, F. C..... 887

Improved Paper Machinery Co..... 948
Industrial Works 953

James Manufacturing Co., D. O..... 966
Jenkins Bros. 967
Jenssen Co., G. D..... 971
Jones Bros. Co..... 980
Jones & Sons Co., E. D..... 994

Kalamazoo Vegetable Parchment Co. 900
Kalamazoo Tank & Silo Co..... 960
Keller, E. J..... 995

Lagerloef Trading Co., Inc..... 993
Laidlaw Bale Tie Co.....1000
Langston Co., Samuel M..... 927
Lindsay Wire Weaving Co., The..... 976
Link Belt Co., The..... 890
Littleford Bros. 960
Lockport Felt Co..... 943
Lunkenheimer Co., The..... 932

Manitowoc Engineering Works..... 955
Meisel Press Mfg. Co..... 974
Mendelson Bros. Paper Stock Co..... ...
Metz & Co., H. A..... 984
Michigan Pipe Co., The..... 992
Moore Steam Turbine Co..... 891
Moore & White Co..... 875
Morse Chain Co..... 882
Mundt & Sons, Charles..... 968
Munising Paper Co..... 900

Nash Engineering Co., The..... 954
National Aniline & Chemical Co., Inc. 877
National Safety Council..... 978
Nekoosa Motor & Mach. Co..... 958
Newport Chemical Works, Inc., The.. 986
Noble & Wood Mach. Co., The..... 972
Nordberg Manufacturing Co..... 905
Northern Engineering Works..... 998
Norwood Engineering Co..... 947

Oliver Continuous Filter Co..... 902
Open Coil Heater & Purifier Co..... 963
Orton & Steinbrenner Co..... 979
Oxford Paper Co..... 901

Paper & Pulp Mill Catalogue..... 906
Pennsylvania Salt Mfg. Co.....1000
Perkins-Goodwin Co. 992
Permutit Co., The..... 903
Pittsburgh Piping & Equipment Co... 878
Plamondon Mfg. Co., A..... 990
Powell Co., The Wm..... 998
Power Specialty Co..... 899
Price & Pierce..... 977
Pulp & Paper Trading Co..... 995
Pusey & Jones Co.....Inside Back Cover

Riter-Conley Co. 998
Robins Conveying Mach. Co.....1000
Ross Engineering Corp., J. O..... 988
Russ Company, E. F..... 987

Sandoz Chemical Works..... 984
Sandy Hill Iron & Brass Works.....1000
Scaife & Sons, Wm. B..... 970
Seybold Machine Co..... 884
Shartle Bros. Machine Co..... 928
Shartle Continuous Beater Co., The.. 975
Shuler & Benninghofen..... 943
Simonds Mfg. Co..... 973
Simons, V. D..... 988
S. K. F. Industries..... 883
Skinner Bros. Mfg. Co..... 908
Smidth & Co., F. L..... 990
Smith & Winchester Mfg. Co..... 956
Southwark Foundry & Machine Co... 954
Standard Ultramarine Co..... 985
Stebbins Engineering Co..... 988
Stowe & Woodward Co..... 986
Sturtevant Co., B. F..... 942
Swenson Evaporator Co..... 955

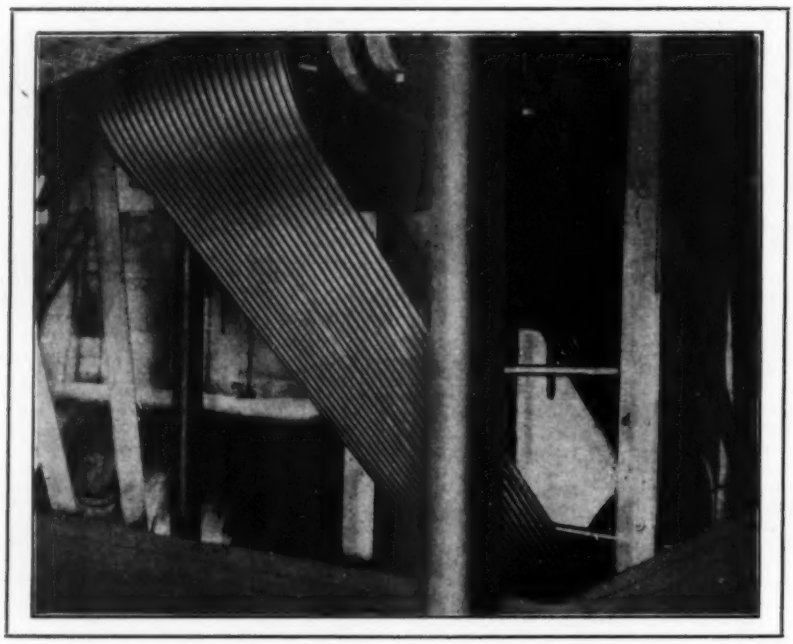
T. A. P. P. I..... 986
Taylor, Styles & Co..... 972
Taylor Wharton Iron & Steel Co..... ...
Terry Steam Turbine Co., The..... 898
Thwing Instrument Co..... 945
Ticonderoga Machine Works..... 949
Toledo Pipe Thread Mach. Co.....1002
Tyler Company, The W. S..... 931

Union Iron Works..... 944
Union Screen Plate Co..... 949
Union Sulphur Co..... 984
U. S. Gypsum Co..... ...

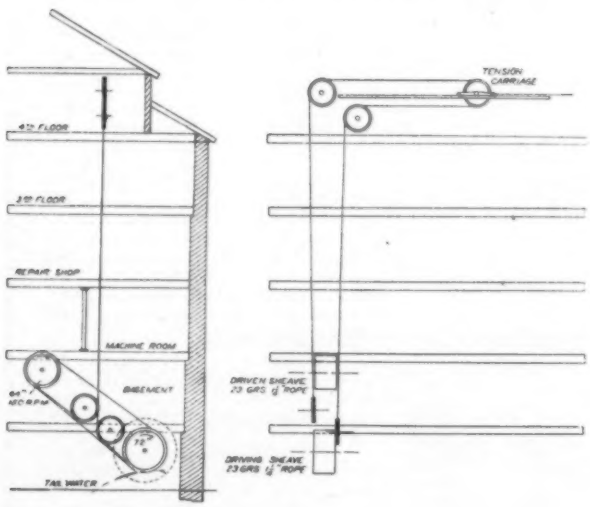
Valley Iron Works Co.....Back Cover

Wallace & Co., Jos. H..... 988
Waterbury Felt Co..... 986
Watervliet Paper Co..... 900
Wausau Sulphate Fibre Co..... 951
Western Paper Makers' Chem. Co.... 985
Westinghouse Electric & Mfg. Co.894, 895
White Tar Aniline Corp., The..... 984
Wing & Evans..... 941
Wisconsin Wire Works..... 896
Wood's Sons Co., T. B..... 957
Wyckoff & Son Co., A..... 968

DODGE



An inclined drive from horizontal turbine in N. Y. Paper Mill



This is an example of how a direct drive of 400 H.P. on short centers and in close quarters was satisfactorily and economically accomplished by using a Dodge American System Rope Drive. Power is transmitted from a horizontal turbine to a main line-shaft in basement. Twenty-three wraps of 1¼" rope are used in this single inclined drive—tension carriage is located in storage space on fourth floor.

The Dodge American System of rope driving provides a quiet, positive and efficient transmission of power—at any capacity. It insures dependable operation in restricted space limits where centers are short—provides for distribution of power in various directions, at any angle, around, under or over obstructions and for long distances.

Dodge engineers are prepared to give you the benefit of over forty years' specialized experience and skill in providing a system of transmission exactly suited to the specific requirements of your mill. Why not put it up to them right now?

Dodge Sales and Engineering Co.

Gen. Offices: Mishawaka, Ind. Wks: Mishawaka & Oneida, N. Y.
NEW YORK CHICAGO PITTSBURGH PHILADELPHIA
CINCINNATI ST. LOUIS ATLANTA MINNEAPOLIS HOUSTON
SEATTLE SAN FRANCISCO

Economical Distribution of Power

THE NEW "WALDORF"

Not a Pleasure Car but a Paper Machine
Inaugurating a New Era in Machine Construction

With

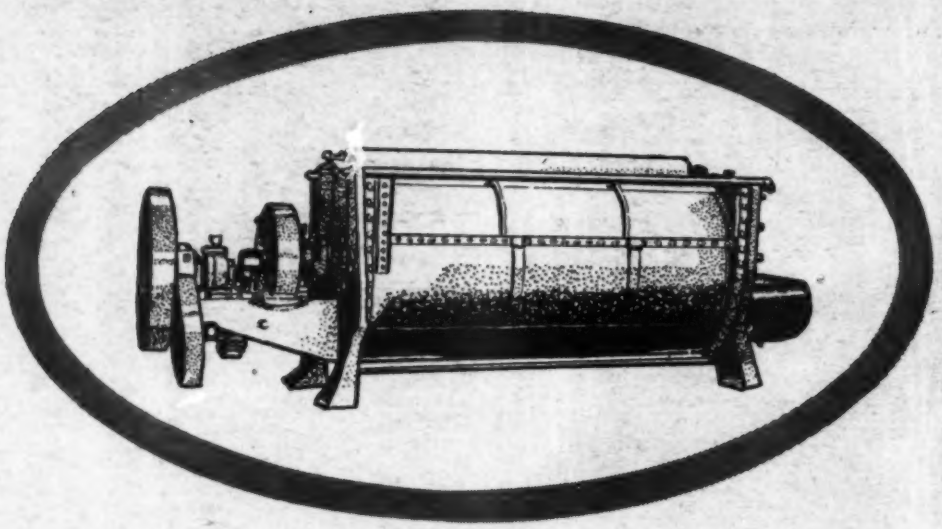
The Closest and Finest Workmanship—Many Labor Saving and Automatic Devices—Power Factor Reduced 80%—Life of Clothing Doubled—Lubrication Reduced to a Minimum.

Virtually "Blazing a Trail" for the Future

Ask Us

The PUSEY and JONES COMPANY

Wilmington, Delaware



The P.A.P.A. Pulp *and* Paper Screen

A Really Successful Inward Flow Rotary Pulp and Paper Screen

Equally well adapted for screening both pulp and paper P. A. P. A. inward flow rotary is the first really successful machine of this sort ever put on the market. Producing exceptional clean pulp and paper, requiring little power, with a very rigid construction, the paper screen has an exceedingly long life and will prove itself many times worth while.

Let us send you further information regarding this valuable piece of equipment. A letter or post card will bring you a full description of the screen.

Why P.A.P.A. Screens Serve You the Best

1. Exceptional clean pulp and paper
2. Results in small power consumption
3. Comparatively light screen plates
4. Can be placed directly on floor
5. Requires no special foundation
6. Easily and quickly erected
7. Automatic cleaning of slots
8. Long lasting screen plates
9. Simple rigid construction
10. Requires little attention
11. Noiseless operation
12. No shaking parts
13. Large capacity
14. No foaming

Kind	Tons	Plate	Size	H.P.
Newspaper	27	.024	2	4
	40	.024	3	4
Kraft paper	17	.024	1	4
	32	.028	2	4
Sulphite pulp	18	.020	2	4
	15	.016	2	4
	17	.018	2	4
	14	.014	2	4
Sulphite	11	.012	2	4
Sulphite easy bleach	28	.024	2	4
Kraft pulps	22	.024	2	4
	30	.028	2	4

Built Only By

Valley Iron Works Co.

Plant: Appleton, Wis. **New York Office: 350 Madison Ave.**